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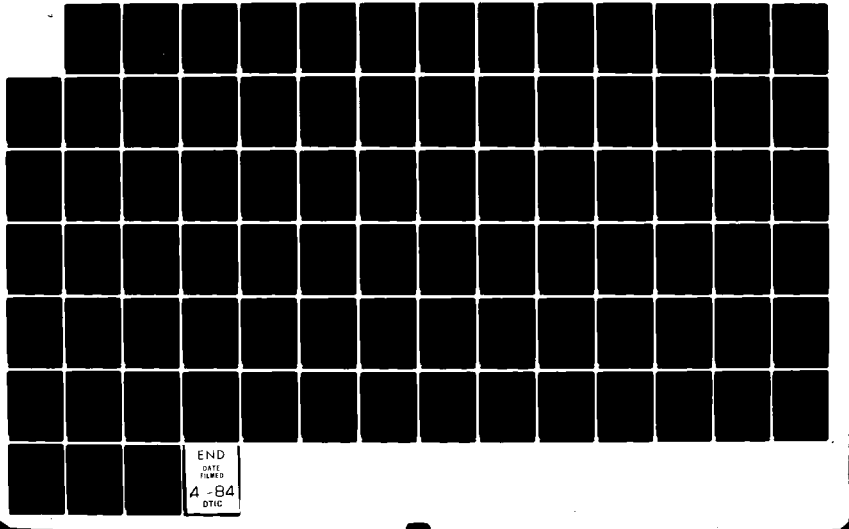

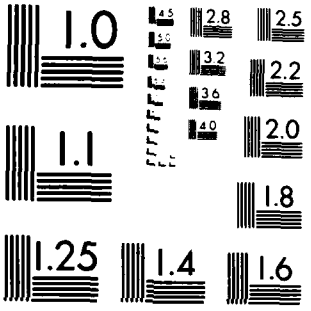

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UPDATED ECONOMIC ANALYSIS OF THE TRI-SERVICE PATIENT APPOINTMENT AND SCHEDULING SYSTEM (TRIPAS)

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February 15, 1984

Final Report for Period 2/17/82 to 2/15/84

Prepared for

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This report presents an overview of the methodology used in the economic analysis of the TRIPAS system and the results of the analysis for the five candidate sites.

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SUMMARY OF FINDINGS

A. INTRODUCTION

The Tri-Service Patient Appointment and Scheduling (TRIPAS) system is an automated information system designed to support the functions of patient appointment and scheduling operations in Military Treatment Facilities (MTFs). To date, under contract with the Tri-Services Medical Information Systems (TRIMIS) Program Office (TPO), TRIPAS systems have been installed in seven MTFs and five more are being considered for procurement.

This Updated Economic Analysis of TRIPAS, prepared by Arthur D. Little, Inc. under contract to TPO, is based on an evaluation of the TRIPAS system installed in the first three MTFs. This Summary presents an overview of the methodology used in the economic analysis and the results of the analysis for the five candidate sites.

B. APPROACH

The Updated Economic Analysis of TRIPAS is based upon an examination of the incremental lifecycle costs and benefits of TRIPAS when introduced into five candidate sites. Installations were assumed to begin in January/February, 1984 and proceed at approximately two-month intervals until the fifth system is installed in August/September, 1984. System acceptance dates are assumed to be 30 days following installation. The effective operating lifetime of each TRIPAS system was assumed to be eight years after the acceptance date.

TRIPAS costs were estimated on the basis of hardware, software, training and maintenance requirements as specified in the vendor contract and on the basis of estimates provided by TPO for communications, site preparation and other operating costs. Benefits were estimated on the basis of data obtained during the TRIPAS evaluation at Keesler AFB which provided information on the benefits resulting from the implementation of a TRIPAS system. Both costs and benefits were phased over time - costs on the basis of the installation and acceptance dates projected for each site and benefits under the assumption that benefits would begin to be fully realized six months

following system acceptance. Cost and benefit estimates were inflated in future years at standard Department of Defense inflation rates and annual costs and benefits for each project year were discounted to present value (FY 1984) at 10 percent. An effort was made to be conservative in making required assumptionsin estimating benefits. The effect of economic assumptions and assumptions made in benefit estimates were tested in a sensitivity analysis.

C. RESULTS

1. Lifecycle Benefits

The present value lifecycle benefits for TRIPAS at five candidate sites are presented by major benefit category in Table 1. Figure 1 illustrates the relative proportion of each benefit category to total lifecycle benefits. As shown, the total estimated benefits are valued at $64.13 million. This total reflects only those benefits that can be valued in dollars so that they can be compared with the costs of TRIPAS on a common basis.

All of the dollar-valued benefits are the result of an increased availability of time - more provider time for patient care, more efficient use of clerk time and more active-duty time for military personnel.

As shown in Figure 1, the category of increased availability of provider time is estimated to contribute the largest benefits, valued at $57 million or 89 percent of total benefits. $56.8 million of this is attributable to an increase in the number of patients seen per provider hour. The TRIPAS system improves the efficiency of obtaining available appointments through ready access to information on providers, clinics and patients and increased ease with which appointemnts may be charged and cancelled. In addition, through workload reporting, the system provides management information to clinic chiefs to ensure that provider time is effectively utilized. Thus, the TRIPAS system, through improved scheduling and improved management of physician time, schedules more patients per physician hour and increases the effective utilization of physician time. The system may also produce non-quantified benefits for improved productivity of other providers, in addition to physicians.

TABLE 1

TOTAL LIFECYCLE COSTS AND BENEFITS FOR TRIPAS BY MAJOR CATEGORY FOR 5 CANDIDATE SITES

	Present Value Lifecycle ($)	Percent Total
BENEFITS		
Increased Availability of Provider Time	57,086,456	89.02
Increased Availability of other MTF Staff Time	539,525	.84
Increased Effective Time of Active-Duty Military Personnel	6,505,418	10.14
TOTAL BENEFITS	64,131,399	100.00
COSTS		
Hardware	3,138,753	52.66
Software	1,373,677	23.05
Communications	557,044	9.35
Other	890,481	14.94
TOTAL COSTS	5,959,955	100.00
NET BENEFIT	58,171,444	

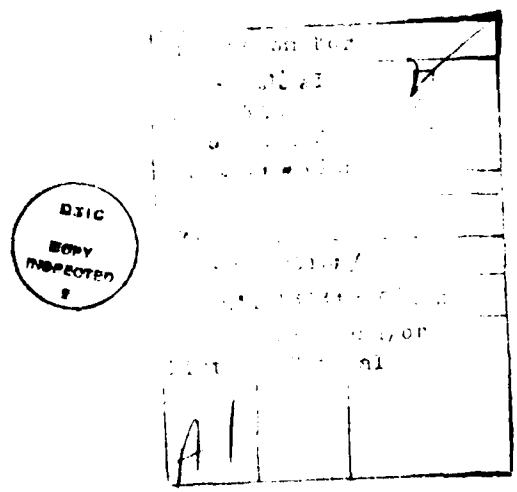
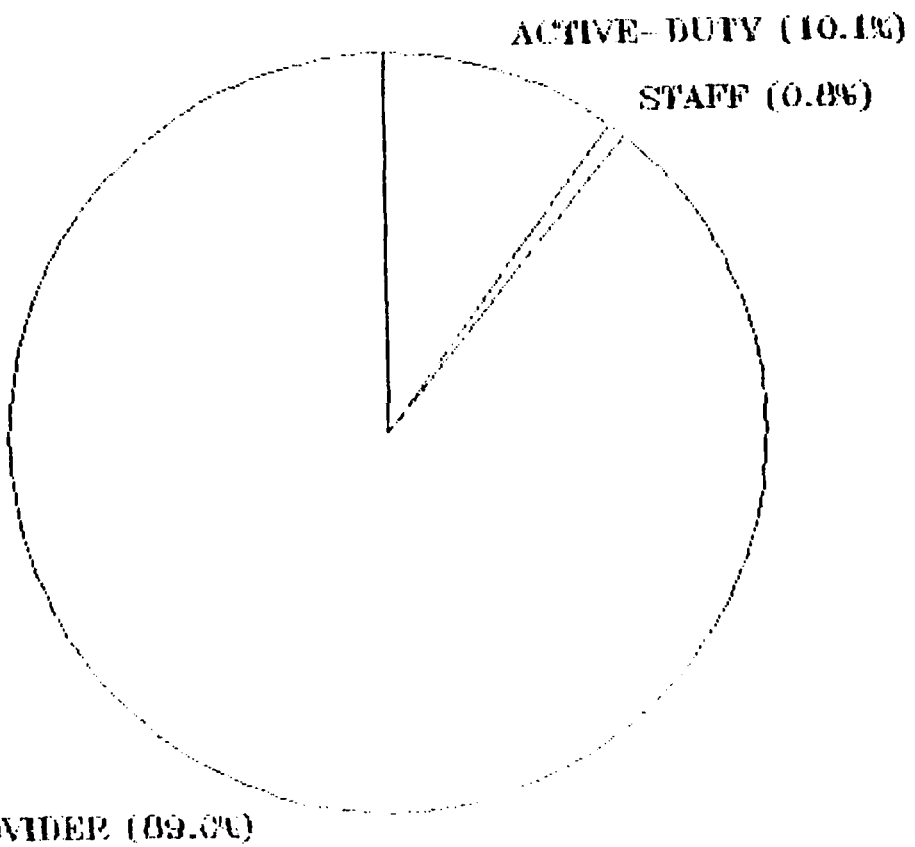


FIGURE 1

PRESENT VALUE LIFECYCLE BENEFITS OF TRIPAS IN 5 CANDIDATE SITES



Distribution of Benefits - $64,131,400

Note: Discounted to present value (FY 1984) at 10%; benefits have been inflated, as applicable by DoD Inflation Index.

The TRIPAS system also produces relatively small quantifiable benefits associated with the increased availability of other MTF staff time. Reductions in clerk time spent making appointments, pulling medical records for outpatient clinic appointments and producing clinic workload reports as part of resources management have all been demonstrated as benefits of the TRIPAS system. These benefits contribute $539 thousand or less than 1 percent to total lifecycle benefits.

Benefits associated with increased effective time of active-duty military personnel account for approximately 10% of total lifecycle benefits ($6.5 million). Active duty patients are saved time as a result of shorter telephone queues and waiting times to make an appointment, a shorter time to actually book an appointment, fewer trips to the MTF as the result of increased multiple same-day appointments, fewer trips to Medical Records to retrieve patient records needed for appointments, and shorter patient waiting times in the clinics.

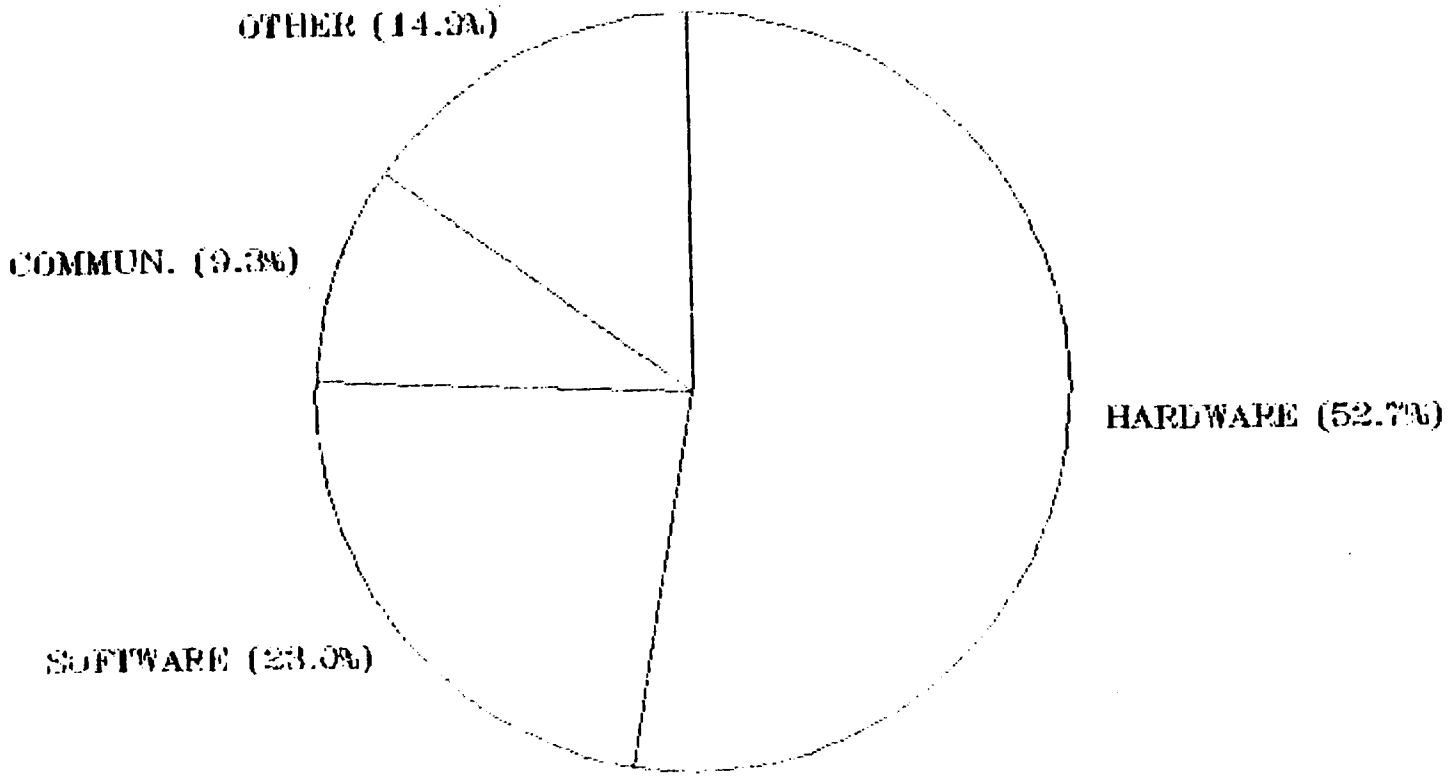
Non-quantified benefits are also expected in the areas of increased service capacity and improved health status. TRIPAS can potentially (this function was not used at Keesler AFB) reduce the number of no-shows through patient reminder letters and increase the availability of appointments in outpatient clinics. TRIPAS may also improve facility management through better workload and staff reporting and increase service capacity through more efficient use of space, equipment and other MTF staff time. Finally, the quality of care and health status of military personnel and their families may be improved in the long-term due to more appropriate scheduling of patients with providers, greater continuity of care by booking patients with a consistent provider and prevention of acute illness by booking appointments for care in the early stages of disease.

2. Lifecycle Costs

The estimated present value lifecycle costs of TRIPAS in five candidate sites are presented in Table 1, by major categories and their relative proportions to total costs is shown in Figure 2. Of

FIGURE 2

PRESENT VALUE LIFECYCLE COSTS OF TRIPAS IN 5 CANDIDATE SITES



Distribution of Costs - $5,959,954

Note: Discounted to present value (FY 1984) at 10% applicable costs have been inflated according to DoD Inflation Index.

the total estimated cost of $5.96 million, the costs of hardware acquisition and maintenance amount to $3.14 million, or approximately 53 percent. Software costs, half of which are associated with software maintenance, amount to $1.37 million or approximately 23 percent of total costs. Communication costs are estimated to be $557 thousand and other costs associated with start-up, training and other operating costs amount to $890.5 thousand.

3. Comparison of Costs and Benefits

The Updated Economic Analysis of TRIPAS in the five candidate sites indicate the following total lifecycle benefits and costs:

	Present Value Lifecycle ($ millions)
TOTAL BENEFITS	64.13
TOTAL COSTS	5.96
NET BENEFITS	58.17

Figure 1 presents the total lifecycle costs and benefits for TRIPAS by major benefit and cost category. Total net lifecycle benefits exceed $58 million. The conclusion that benefits exceed costs is insensitive to changes in either the economic assumptions employed or to the major assumption in benefit estimates tested.

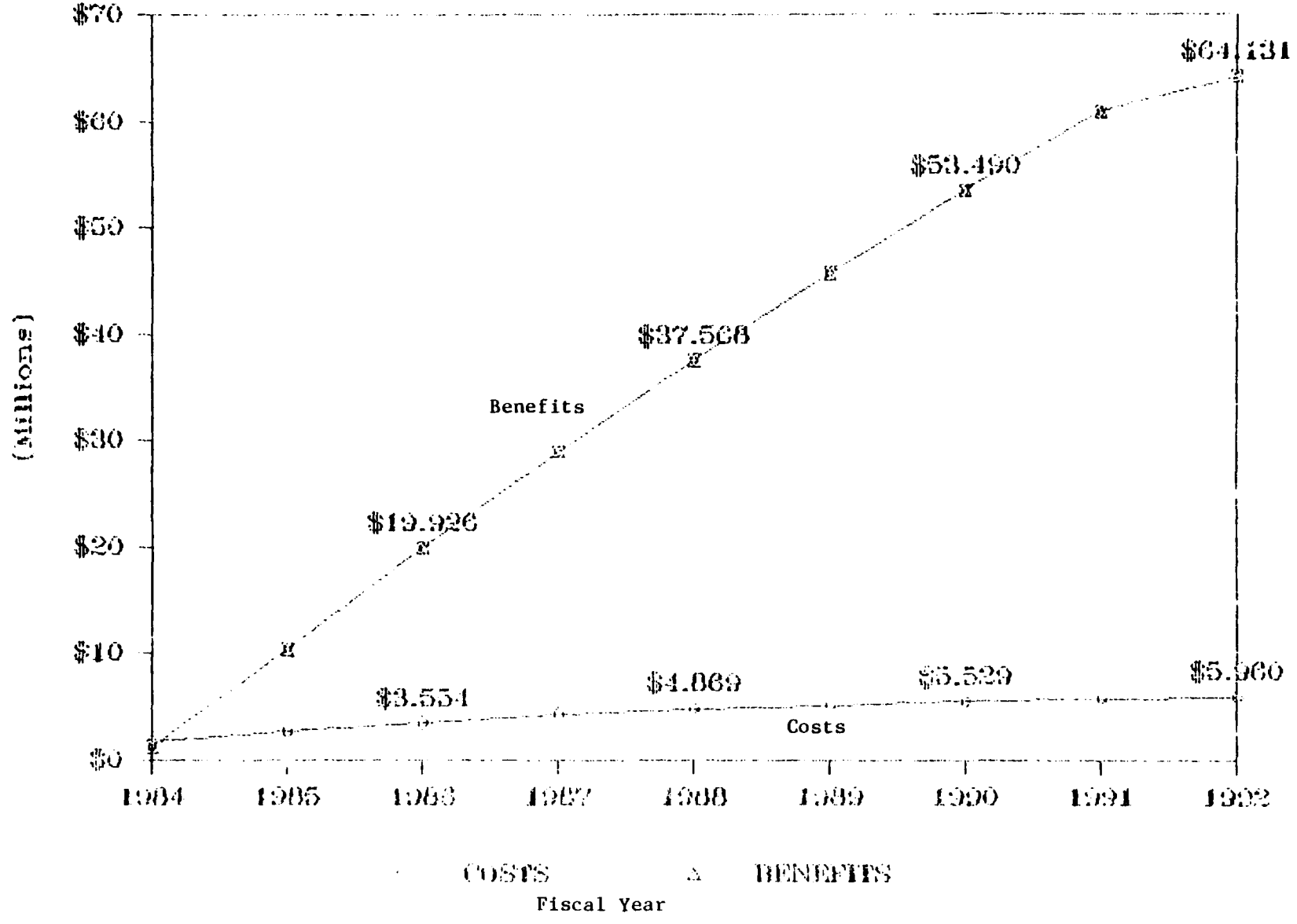
Figure 3 compares the cumulative annual estimated present value costs and benefits of TRIPAS in five candidate sites over the lifetime of the TRIPAS project. After 1985, the estimated cumulative benefits exceed the estimated cumulative costs every year until project termination in FY 1992.

D. CONCLUSION

The results of the Updated Economic Analysis of the Patient Appointment/Scheduling (TRIPAS) system indicate a substantial margin between estimated present value lifecycle costs and benefits. In addition to the dollar-valued benefits of TRIPAS there are other important, as yet unquantified, benefits to patient care and the satisfaction of patients and health care providers with the DoD health care delivery system.

FIGURE 3

CUMULATIVE COSTS AND BENEFITS OF TRIPAS IN 5 CANDIDATE SITES



Note: Discounted to present value (FY 1984) at 10% Costs and Benefits inflated, as applicable, by DoD Inflation Index.

* 1984 Costs equal $1.85 million
1984 Benefits equal 1.30 million

Arthur D. Little, Inc.

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I. INTRODUCTION

A. BACKGROUND

The Tri-Service Patient Appointment and Scheduling System (TRIPAS) is an automated information system designed to support the functions of patient appointment and scheduling operations in Military Treatment Facilities (MTF). TRIPAS is an adaptation of the software for an automated patient scheduling and appointment system which was developed by Medical Data Corporation.* On September 30, 1983, a contract became effective between Martin Marietta (prime contractor) and the TRIMIS Program Office (TPO), calling for installation of a TRIPAS System at three MTFs, with an option to install systems at nine more candidate sites. A contract modification and subsequent changes in line item prices became effective April 1, 1983(1). As of January, 1984 seven systems had been installed and five more are being considered for procurement. Martin Marietta now owns the rights to the TRIPAS software.

This report presents the methodology employed in and the results of an Updated Economic Analysis of the TRIPAS system in the five remaining candidate sites. The remainder of this chapter describes the overall scope of and approach to the economic analysis. Chapters II and III present methodologies used in estimating total lifecycle benefits and costs, respectively, and the results obtained. Chapter IV discusses the findings regarding lifecycle benefits and costs of the TRIPAS System. In Chapter V, the sensitivity of findings to major assumptions is tested. Further details concerning the analysis are provided in four supporting appendices (A-D).

B. SCOPE AND APPROACH

1. Scope

The scope of the present analysis is the costs and benefits of TRIPAS in five candidate MTFs characterized in Table 2. Installations of TRIPAS at the five sites were assumed to begin in FY 1984 and to continue with installations at approximately two-month intervals at

* At the time of the TRIPAS procurement, Medical Data Corporation was wholly owned by HBO of Atlanta, Georgia.

TABLE 2

CHARACTERISTICS AND TIME PHASING OF TRIPAS SITES[a]

Site	Projected Date of Acceptance	1981 Workload[b] Total Outpatient Visits	1981 Workload[b] Total Active-Duty[c] Patient Visits
Darnell AH	March, 1984	886,768	336,972
NAVHOSP, Bethesda	May, 1984	965,158	366,760
USAF RH Carswell AFB	July, 1984	256,612	97,513
Letterman AMC	September, 1984	695,435	264,265
NAVHOSP, Oakland	October, 1984	880,605	334,630

[a] TRIPAS candidate sites identified by TPO.

[b] Army workload data from Command Performance Summary, Fiscal Year 1981, US Army Health Services Command, Ft. Sam Houston, TX. Navy data from Medical Services Report NAVMED 6300/1 Fiscal year 1981. Air force data from Selected Workload Items for Air Force MTFS for Fiscal year 1981.

[c] Active-duty patient visits represent 38% of total outpatient visits. Source: Selected Medical Care Statistics. Quarter ending June 30, 1983, Directorate for Information Operations and Reports (810R), The Pentagon, Washington, D.C.

the remaining sites. System acceptance dates, which are assumed to be thirty days after installation are shown in Table 2. Each system was assumed to have an effective operating lifetime of eight years in accordance with DoD principles of lifecycle management. The lifetime for each site was assumed to begin with the acceptance date (Table 2).

2. Approach

The approach taken in developing the Updated Economic Analysis of TRIPAS was an examination of the incremental lifecycle costs and benefits of TRIPAS introduced into five MTFs when compared with manual operations. The benefits and costs of TRIPAS for each year of the system lifetime were estimated by using benefit and cost algorithms based on the characteristics of the sites. The schedule of events and site installation costs were obtained from the TRIPAS contract (1) and benefits were derived from TRIPAS evaluations (2,3).

3. Functional Capabilities of the TRIPAS System and their Assessment

The major functions of TRIPAS are: creating care provider schedules; registering eligible patients; booking and cancelling appointments to care provider schedules; generating medical record pull lists; generating lists of appointed patients by date, time, clinic, and provider; and providing an accurate count of the number of patient visits by clinic and activity center. The system is capable of monitoring clerk and provider productivity and generating patient reminder letters.

The impact of these functions has been assessed at three sites: Brooke Army Medical Center, San Antonio, Texas; Ehrling Bergquist USAF Regional Hospital, Omaha, Nebraska (2); and USAF Medical Center, Keesler Air Force Base, Biloxi, Mississippi (3). Results from the Keesler evaluation are the basis for the Updated Economic Analysis. The functional impacts assessed in these evaluations and presented in the Updated Economic Analysis are consistent with the TRIPAS system objectives and evaluation criteria developed by the TRIMIS Medical Review Group in April, 1978 (4).

II. SYSTEM BENEFITS

A. APPROACH

Five categories of benefits are realized following the implementation of the TRIPAS System:

- Increased availability of provider time;
- Increased availability of other MTF staff time;
- Increased availability of effective time of active-duty military personnel;
- Increased service capacity; and
- Improved health status.

Specific benefits have been identified within each of these categories based on the evaluation of TRIPAS as implemented at Keesler Air Force Base. Benefits in the first three categories, all pertaining to time savings, were the only benefits that could be reliably quantified and valued, based on available data. Through the use of a series of benefit algorithms, the quantified benefits have been extrapolated to the five candidate sites scheduled to receive TRIPAS.

Each benefit algorithm includes a rate of change, the volume of workload that would be affected, and a cost per unit of change. For example, the dollar value of a reduction in the time spent by clerks scheduling appointments for outpatient visits was estimated by the following general algorithm:

estimated reduction in time	x	annual number of outpatient visits	x	cost of clerk time

= predicted annual dollar value benefits

Thus, each benefit was estimated in a three-step process:

1) the magnitude of the change was determined based on the evaluation of the TRIPAS system,

2) the volume of affected activity (workload) was specified for each candidate site, and

3) the change was valued with a unit cost.

Details concerning each benefit algorithm are given in Appendix A. The source of information concerning the magnitude of changes associated with automation of patient appointment and scheduling systems is the functional evaluation of TRIPAS installed at Keesler Air Force Base in February, 1982. Fiscal Year 1981 workload data were obtained for each of the five sites (see Table 2) and were assumed to remain constant during the eight-year TRIPAS lifecycle. Benefits of TRIPAS were valued in dollars so that they could be compared with costs on a common basis. All of the benefits of TRIPAS are time savings of MTF personnel and active-duty military personnel. For military personnel, leave and quarters allowances, fringes, and other special payments were added to basic pay. Compensation for a hypothetical typical active-duty patient was based on the proportion of officers and enlisted personnel in the service. Time savings were valued according to DoD pay scales (Table 3).

B. LIFECYCLE BENEFITS

Benefits were assumed to be realized six months following acceptance of a TRIPAS system. Based on experience at Keesler AFB, it was assumed that after six months procedures would be modified to accommodate the system and personnel sufficiently experienced in system use to take advantage of labor-savings functions. Benefits were assigned to individual fiscal years according to the time lag for benefits realization and the projected timing of system implementation for each site (shown in Table 2).

Unit costs for benefits in FY 1984 dollars were inflated for subsequent years according to the three inflation indices shown in Table 4. Generic personnel time costs for all categories but clerk time were inflated by the rate for military personnel costs; the inflation rate for clerks was based on a mix of civilian and military personnel costs. The DoD Inflation Index was used in the analysis of the Base Case and other indices were used in the sensitivity analyses.

TABLE 3

DOLLAR VALUE OF TIME FOR GENERIC PERSONNEL AND PATIENTS IN MEDICAL TREATMENT FACILITIES, FY 1983[a]

	Dollar Value of Time[a]			
	Per Year	Per Day[b]	Per Hour	Per Minute
Active-Duty Patient[c]	27,880	111.52	13.94	0.23
Clerk	17,056	68.22	8.53	0.14
Physician	64,846	259.38	32.42	0.54

[a]Civilian salaries from Federal Employees' Salary Scale (FY 83). GS-9 for nurses, GS-11 for other providers and GS-14 for physicians (all Step 4). Includes leave allowance of 20.9% and fringe of 21.7%. Military salaries: Includes basic pay from annual composite salarm schedules table (FY 83). Ranks used were: Clerks = E-1; Technicians = E-4; Nurses = 0.1; and Physicians = 0.4. Rates were adjusted by leave allowance of 20.9% and 38% fringe plus quarters and other special pays. Mix of personnel by Military Department and civilian personnel computed using data on ransk and categories from Health Manpower Statistics, Fiscal Year 1982, Directorate for Information Operations and Reports (DIOS), The Pentagon, Washington, D.C., June 1983.

[b]Based on 250 workdays per year and eight hours per workday.

[c]Mix of active-duty personnel by Military Departments computed using data on ranks from Military Manpower Statistics, Directorate for Information Operations and Reports (DIOR). The Pentagon, Washington, D.C., July 1983.

[d]Includes physician's assistants, nurse practitioners, optometrists, podiatrists, and psychologists.

TABLE 4

INFLATION RATES USED IN LIFECYCLE ANALYSIS OF COSTS AND BENEFITS

Inflation Index/Category	Inflation (Percent per Year) 1984-1985	1985-1986	1986-1987	1987-2005
DoD Index[a]				
Operating and Maintenance Costs	4.8	4.6	4.5	4.5
Personnel Costs	4.8	4.6	4.5	4.5
All Military	4.8	4.6	4.5	4.5
Mixed	4.8	4.6	4.5	4.5
All Civilian	4.8	4.6	4.5	4.5
HCFA Project Inflation[b]				
Other Miscellaneous	6.2	6.2	6.2	6.2
Personnel Costs	7.5	7.5	7.5	7.5
All Military	7.4	7.4	7.4	7.4
All Civilian	7.2	7.2	7.2	7.2
Rate Control[c]				
Other	6.2	6.2	6.2	6.2
Personnel Costs				
All Military	10.3	10.3	10.3	10.3
Mixed	10.3	10.3	10.3	10.3
All Civilian	10.1	10.1	10.1	10.1

[a] Data provided by Chief, Resources Division, TRIMIS Program Office.

[b] As shown in Rate Control Supplement, February 1983.

[c] As shown in Rate Control Supplement, February 1983.

Benefits in future years were discounted to present value with discount rates of 6, 8, 10 and 12 percent. The 10 percent rate mandated by DoD was used in the Base Case analysis; the three other rates were used in the sensitivity analysis.

C. RESULTS

The present value* lifecycle benefits of TRIPAS at the five candidate sites are presented in Table 5, which gives detailed results for all benefits that have been quantified. The value of each benefit is also expressed as a proportion of the total valued benefits attributable to the system. The total estimated lifecycle benefits are valued at $64.13 million. In addition, the system is expected to provide several benefits which cannot, at this time, be accurately quantified. These are discussed below in the context of the five major benefit categories.

1. Increased Availability of Provider Time

Benefits associated with increased availability of provider time account for 89% ($57.1 million) of total lifecycle benefits. These benefits are associated predominantly with an increase in physician productivity results from improved scheduling in the number of patient visits per physician hour spent in the outpatient clinics and more efficient use of provider time. Also included is a reduction in physician time spent in clinic administration as a result of workload reports generated by the TRIPAS system.

In addition to these quantified benefits associated with physician time, TRIPAS may improve the productivity and reduce administrative time spent by other providers. Although this has not been quantified, it could include benefits associated with physician extenders, physician assistants, dentists, dental extenders, and other health care providers (e.g., M.S.W., R.N., O.D., P.T., O.T.,

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* Inflated at DoD inflation rates; discounted at the DoD standard rate of 10%.etc.)

TABLE 5

ESTIMATED PRESENT VALUE LIFECYCLE BENEFITS OF TRIPAS IN 5 CANDIDATE SITES

Benefit: Source of Benefit	Present Value Lifecycle Benefits (Thousands of $)[a]	Percent of Total Cost
Increased Availability of Provider Time		
1. Increased Physician Productivity: Visits per hour	56,849.31	88.64
2. Reduction in Physician Time: Administration in Clinics	237.14	.37
Subtotal	57,086.45	89.02
Increased Availability of Other MTF Personnel Time		
1. Reduction in Clerk Time: Appointment Scheduling	465.20	.73
2. Reduction in Clerk Time: Medical Reports	64.97	.10
3. Reduction in Clerk Time: UCA Reporting	9.36	.01
Subtotal	539.53	.84
Increased Effective Time of Active-Duty Military Personnel		
1. Reduction in Non-effective Active-Duty Time: Reduction in Telephone Queue to make an appointment	456.45	.71
2. Reduction in Non-effective Active-Duty Time: Appointment Scheduling	154.80	.24
3. Reduction in Non-effective Active-Duty Time: Multiple Appointments Scheduled for the Same Day	1,726.57	2.69
4. Reduction in Non-effective Active-Duty Time: Retrieving Medical Records	198.46	.31
5. Reduction in Non-effective Active-Duty Time: Patient Waiting Time in Clinics	3,969.14	6.19
Subtotal	6,505.42	10.14
TOTAL	64,131.40	100.00

Other potential benefits associated with increased availability of provider time which have not been quantified include increased retention and recruitment of providers as a result of greater satisfaction with the scheduling and appointment process. TRIPAS, through reduction of lost paper elements (e.g., test results, medical records) that are required for patient visits, may reduce the need for repeat tests and visits and increase the availability of provider and patient time.

2. Increased Availability of Other MTF Personnel Time

Benefits associated with increased availability of other MTF personnel time account for $539 thousand or less than 1 percent of total lifecycle benefits. The time spent by appointment clerks scheduling patient appointments was reduced due to increased access to information for individual providers, clinics and patients, and the increased ease with which appointments can be changed or cancelled. TRIPAS also generates automated pull lists for medical records which increases the effectiveness and efficiency of medical records clerks. Finally, TRIPAS generates workload reports by clinic on a daily and monthly basis and this results in time savings for UCA clerks in Resource Management offices.

Data were not available to quantify some other MTF personnel time benefits expected to accrue from TRIPAS. For example, TRIPAS may increase retention and recruitment of other staff due to increased satisfaction with the scheduling and appointment process. It may also, through increased access to patient demographic information, reduce the time staff spend retrieving information and producing redundant records. It also may reduce the time other staff spend generating reports.

3. Increased Effective Time of Active-Duty Military Personnel

Of total lifecycle benefit dollars, approximately 10 percent or $6.5 million are associated with reductions in non-effective time spent by active-duty military personnel. Both the time spent waiting in telephone queues to make an appointment and the actual time spent making the appointment were reduced as a result of TRIPAS. In

addition, TRIPAS increased the ease with which multiple same-day appointments could be made and resulted in fewer trips spent traveling to and from MTFs. As a result of the automated pull lists generated by TRIPAS for the Medical Records Department, more patients had medical records and thus, fewer patients were required to spend time retrieving their own medical records. Finally, through improved scheduling, patient waiting time in the clinics was reduced. All of these time savings have the potential for increasing the non-effective time for active-duty military patients. It was assumed, to be conservative, that only 50% of active-duty patients would actually return to duty earlier as a result of these time savings.

Another non-quantified benefit of TRIPAS associated with increased effective time of active-duty military personnel includes increased retention and recruitment as a result of increased satisfaction with health care services and the improved ability to schedule appointments.

4. Increased Service Capacity

Benefits associated with increased service capacity were not quantified due to insufficient data on the changes that result from TRIPAS. A benefit to patients which has not been valued is the increased availability of appointments at MTFs. TRIPAS may also reduce no-show rates in clinics if patient reminder letters are generated and sent. This function was not used at the MTF where the evaluation data were collected. TRIPAS may also improve facility management as a result of more accurate workload and staffing reporting. Increases in more efficient use of space, equipment and manpower could potentially be realized as an increase in service capacity.

5. Improved Health Status

TRIPAS, through improved scheduling, could result in reduced waiting periods from the time an appointment is requested to the time a patient is seen; in reduced missed appointments and thus, delayed care; in improved continuity of care by scheduling patients with the same provider and scheduling same-day multiple visits; and in an improved mix of emergency and scheduled corrective/preventive care for

each provider, clinic and day. All of these have implications for improved quality of care and improved health status for the patients receiving care in MTFs. These benefits, however, were not quantified due to the time frame required to demonstrate such long term changes.

III. SYSTEM COSTS

A. APPROACH

The costs of implementing TRIPAS in five candidate sites have been broken down into four major categories: 1) hardware, 2) software, 3) communications, and 4) other costs. A total of 18 cost items are included and a cost algorithm has been developed for each cost item. Details regarding the algorithms for specific cost items are presented in Appendix B.

Hardware costs include the cost of leasing and purchasing equipment, installation of equipment and the recurring cost of hardware maintenance over the eight-year operating lifecycle. The non-recurring hardware cost items are the purchase of a Medical Treatment Recording Card (MTRC) and hardware installation. The recurring hardware cost items are leasing equipment for four years under a lease-to-ownership plan, the costs associated with both the principal period of maintenance and outside the principal period of maintenance, and maintenance of the MTRC.

Software costs include two non-recurring and one recurring cost items. The non-recurring software costs include a one-time software license/fee and documentation. The recurring cost item is for maintenance of the software during the operating lifetime at each site.

Communications costs include a non-recurring cost for the purchase of communications equipment and a recurring cost for maintenance of the communications equipment. The category of other costs includes three non-recurring cost items: site preparation, training of site personnel and system implementation. Non-recurring costs in the other category include supplies, cost of space as overhead and cost of a technician (.25 FTE) to support the system.

B. LIFECYCLE COSTS

1. Time Phasing

Costs for the TRIPAS system were incurred at each site beginning at the date of project acceptance as specified in Table 2.

Non-recurring costs were incurred in 1984, the year all five of the sites are scheduled to receive the system. Recurring costs were incurred for a full eight years at each site following system acceptance. Further details about the time phasing of specific cost items are provided in Appendix B.

2. Inflation and Discounting

Future costs were inflated using the DoD Inflation Index (shown in Table 4). The inflation rate for "Other" was applied to all equipment, supply and overhead costs. The "Other" rate was also applied to all maintenance costs with the exception of costs associated with the principle period of maintenance and outside the principle period of maintenance which were inflated according to a specific schedule of inflation rates as specified in the TRIPAS vendor contract. (See Appendix B for further details). Costs for support personnel were inflated using the Mixed Personnel rate. The two other inflation indices, are developed by the Health Care Financing Administration, DHHS and one published in the Rate Control Supplement were used in the sensitivity analyses.

Costs in future years were also discounted to present value with a discount rate of 10 percent, as mandated by DoD. Discount rates of 6, 8, and 12 were used in the sensitivity analyses.

C. RESULTS

The estimated present value lifecycle costs of TRIPAS are presented in Table 6. Of the total estimated cost of $5.96 million, hardware costs contribute $3.14 million or approximately 53%. Software costs contribute an estimated $1.37 million (approximately 23%) to the total estimated lifecycle costs. The dominant cost item in this category is software maintenance which represents almost 17% of total lifecycle costs.

Communications costs are estimated to total $557 thousand or 9% of total lifecycle costs. Other costs are estimated to total $800 thousand or nearly 15% of total lifecycle costs. Major contributors in the other cost category include site preparation (4%), supplies (6%), and support personnel (3%).

TABLE 6

ESTIMATED PRESENT VALUE LIFECYCLE COSTS
OF TRIPAS IN 5 CANDIDATE SITES

Cost Category	Present Value[a] Lifecycle Costs (Thousands of $)	Percent of Total
HARDWARE		
Non-Recurring		
Medical Treatment Recording Card	$ 125.00	2.10
Hardware Installation	144.00	2.42
Recurring		
Equipment	1,651.38	27.71
PP Maintenance	1,044.83	17.53
Outside PPM	746.76	1.25
MTRC Maintenance	98.87	1.66
Subtotal	3,138.75	52.66
SOFTWARE		
Non-Recurring		
Software License & Fee	375.00	6.29
Documentation	10.00	.17
Recurring		
Software Maintenance	988.68	16.59
Subtotal	1,373.67	23.05
COMMUNICATION		
Non-Recurring		
Communication Equipment	375.80	6.31

TABLE 6 (Continued)

ESTIMATED PRESENT VALUE LIFECYCLE COSTS
OF TRIPAS IN 5 CANDIDATE SITES

Cost Category	Present Value[a] Lifecycle Costs (Thousands of $)	Percent of Total
Recurring		
Communication Maintenance	181.24	3.04
Subtotal	557.04	9.35
OTHER		
Non-Recurring		
Training	71.14	1.19
System Implementation	12.50	.21
Site Preparation	240.00	4.03
Recurring		
Supplies	360.18	6.04
Overhead (space)	14.99	.25
Support Personnel	191.67	3.22
Subtotal	800.48	14.94
TOTAL	5,959.96	100.00

[a]Discount rate of 10 percent; DoD Inflation Index.

IV. LIFECYCLE BENEFITS AND COSTS

A. RESULTS

As discussed in previous chapters, the present value lifecycle benefits of TRIPAS are estimated to total approximately $64 million in the five sites considered in the present analysis. The present value costs throughout the TRIPAS lifecycle in the five sites are estimated to total approximately $6 million.

The specific annual TRIPAS benefits and costs by category are shown in Table 7 for each project year. As indicated, the time stream of estimated costs begins in FY 1984 and the time stream of estimated benefits begins six months following system acceptance at each site. Beginning in FY 1985, the estimated present value annual costs are exceeded by the estimated present value annual benefits in each year until the project expiration dates. The total present value lifecycle net benefit (total benefits minus total costs) equals approximately $58 million. In conclusion, the present value TRIPAS benefits exceed costs by a substantial margin beginning in the second year of system operation and continue over the total lifecycle of the TRIPAS system.

The sensitivity of these results to the major economic assumptions and assumptions underlying major benefit estimates is tested in the following chapter.

TABLE 7
TOTAL ESTIMATED LIFECYCLE BENEFITS AND COSTS OF TRIPAS
BY MAJOR CATEGORY, BY YEAR FOR ALL 5 CANDIDATE SITES

	Present Value Annual Total (Thousands of Dollars)[a]										
Benefits	1984	1985	1986	1987	1988	1989	1990	1991	1992	Total[b]	Percent of Total
Increased Availability of Provider Time	1,158.2	8,102.0	8,477.2	8,053.3	7,650.7	7,268.1	6,904.7	6,559.5	2,912.6	57,086.4	89.02
Increased Availability of Other MTF Personnel Time	10.7	76.7	80.1	76.1	72.3	68.7	65.3	62.0	27.7	539.5	.84
Increased Effective Time of Active-Duty Military Personnel	132.1	923.3	966.0	917.7	871.8	828.3	786.8	747.5	331.9	6,505.4	10.14
TOTAL BENEFITS[b]	1,301.0	9,102.0	9,523.4	9,047.2	8,594.8	8,165.1	7,756.8	7,369.0	3,272.1	64,131.4	100.00
Costs											
Hardware	628.0	626.4	588.1	552.0	321.3	136.3	124.4	115.4	46.9	3,138.8	52.66
Software	462.5	142.9	135.9	129.1	122.6	116.5	110.7	105.2	48.3	1,373.7	23.05
Communication	389.9	26.2	24.9	23.7	22.5	21.3	20.3	19.3	8.9	557.0	9.35
Other	369.0	81.9	77.9	74.0	70.3	66.8	63.4	60.2	27.0	890.5	14.94
TOTAL COSTS[b]	1,849.4	877.4	862.8	778.8	536.8	340.9	318.8	300.1	131.1	5,960.0	100.00
NET BENEFITS[c]	(-548.4)	8,224.6	8,696.6	8,268.4	8,058.0	7,824.2	7,438.0	7,069.0	3,141.0	58,171.4	

[a]Discount rate of 10 percent; DoD Inflating Index.

[b]May not add to sum of results for each category and year due to rounding for each year.

[c]Net Benefits equal Total Benefits minus Total Costs.

V. SENSITIVITY OF RESULTS TO MAJOR ASSUMPTIONS

A. INTRODUCTION

As discussed in the previous chapter, the results of the Updated Economic Analysis of TRIPAS indicate that the present value lifecycle benefits exceed the present value lifecycle costs by a substantial margin. A number of assumptions were made in projecting costs and benefits into the future for the five candidate sites. The major assumptions have been identified and re-examined in order to test their influence on the results of the analysis. The remainder of this chapter discusses the sensitivity analyses performed for two categories of major assumptions employed:

- assumptions underlying major benefit estimates, and
- economic assumptions employed in projecting benefits and costs throughout all years of the lifecycle of TRIPAS.

B. ASSUMPTIONS REGARDING MAJOR BENEFITS

1. Introduction

Several assumptions were made in developing the algorithms for calculating the benefits of TRIPAS. A sensitivity analysis was performed to test the assumptions underlying those benefits that represent 10 percent or more of total estimated benefits. Only the effects of reducing expected benefits were tested. It may be, however that the potentially realized benefits have been underestimated. Since underestimating benefits does not put the cost benefitiality of TRIPAS at risk, the effect of increasing the benefit estimates was not tested. The major benefit areas examined include:

- Increased Availability of Physician Time: Physician Productivity (88.6 percent of total benefits); and
- Increased Effective Time of Active-Duty Military personnel (10.1 percent of total benefits).

The methods of estimating these benefits included the following major assumptions:

- Increased Physician Productivity - In calculating the provider productivity benefit, an implicit assumption was made that the magnitude of the change in patient visits per provider hour observed at one TRIPAS evaluation site

would be the same for all five candidate sites. In fact, the number of patient visits per provider hour may vary considerably across sites under a manual system and the impact of TRIPAS on provider productivity may also vary from site to site. For sites with less efficient scheduling procedures under a manual system the impact of TRIPAS may be greater than that observed in the TRIPAS evaluation and for sites with relatively high provider productivity the TRIPAS system may have a very small impact. It was assumed that, on average, the change in provider productivity resulting from automation under TRIPAS would be the same at all candidate sites. Because of the major importance of this benefit, which contributes nearly 90 percent to the total estimated benefits, the effect of reduced realization of the provider productivity benefit on total present value lifecycle benefits was tested.

- Military Personnel Returning to Active Duty - In calculating four of the benefits contributing towards increased effective time of active-duty military personnel, it was assumed that only half of the active-duty personnel would actually return to duty earlier as a result small time savings (less than 15 minutes). The specific benefits involved and associated time savings are: patient waiting time in clinic (4 minutes per active duty visit); retrieving medical records (10 minutes per active duty patient affected); time in telephone queue waiting to make an appointment (.41 minutes per active duty call); and time to schedule an appointment (.13 minutes per active-duty call). While the assumption that only 50% of active-duty patients would use these time savings to return to duty earlier was felt to be a conservative one, it may be that little or none of this time will result in reduced non-effective time due to the fact that the individual time savings are all less than 15 minutes. Because these active-duty savings benefits represent

represent approximately 10 percent of total lifecycle benefits, the impact of their elimination was tested.

2. Results of Sensitivity Analysis of Benefit Assumptions

a. Introduction

The results of the sensitivity analysis of benefit assumptions is presented below. A detailed presentation of the results of the analysis for specific benefits is presented in Table D-1, Appendix D.

b. Increased Physician Productivity

Figure 4 displays the effect of reducing the percentage of provider productivity benefits realized as a result of TRIPAS, assuming that the Base Case represents 100 percent. If expected provider productivity benefits are reduced by 50%, the total present value lifecycle benefits are reduced by $28.42 million. This results in a total benefit of $35.71 million and a net benefit (total benefit minus total cost) of $29.75 million. As the figure illustrates, even if no provider productivity benefits are realized, which is believed highly unlikely, there would still be an estimated net benefit of over $2 million. Thus, while the results are highly sensitive to changes in the extent to which the provider productivity benefits are realized, they are not totally dependent on this benefit and a significant reduction in this benefit still produces a substantial overall net benefit.

c. Military Personnel Returning to Active Duty

Figure 5 displays the effect of eliminating four benefits representing small time savings (less than 15 minutes) for reduced non-effective time of active-duty military personnel. The result is a decrease in total lifecycle benefits of $4.78 million. The remaining total lifecycle benefits are $59.35 million with a net benefit of $53.39 million. Thus, the conclusion that benefits exceed costs by a substantial margin is not dependent upon realizing these benefits.

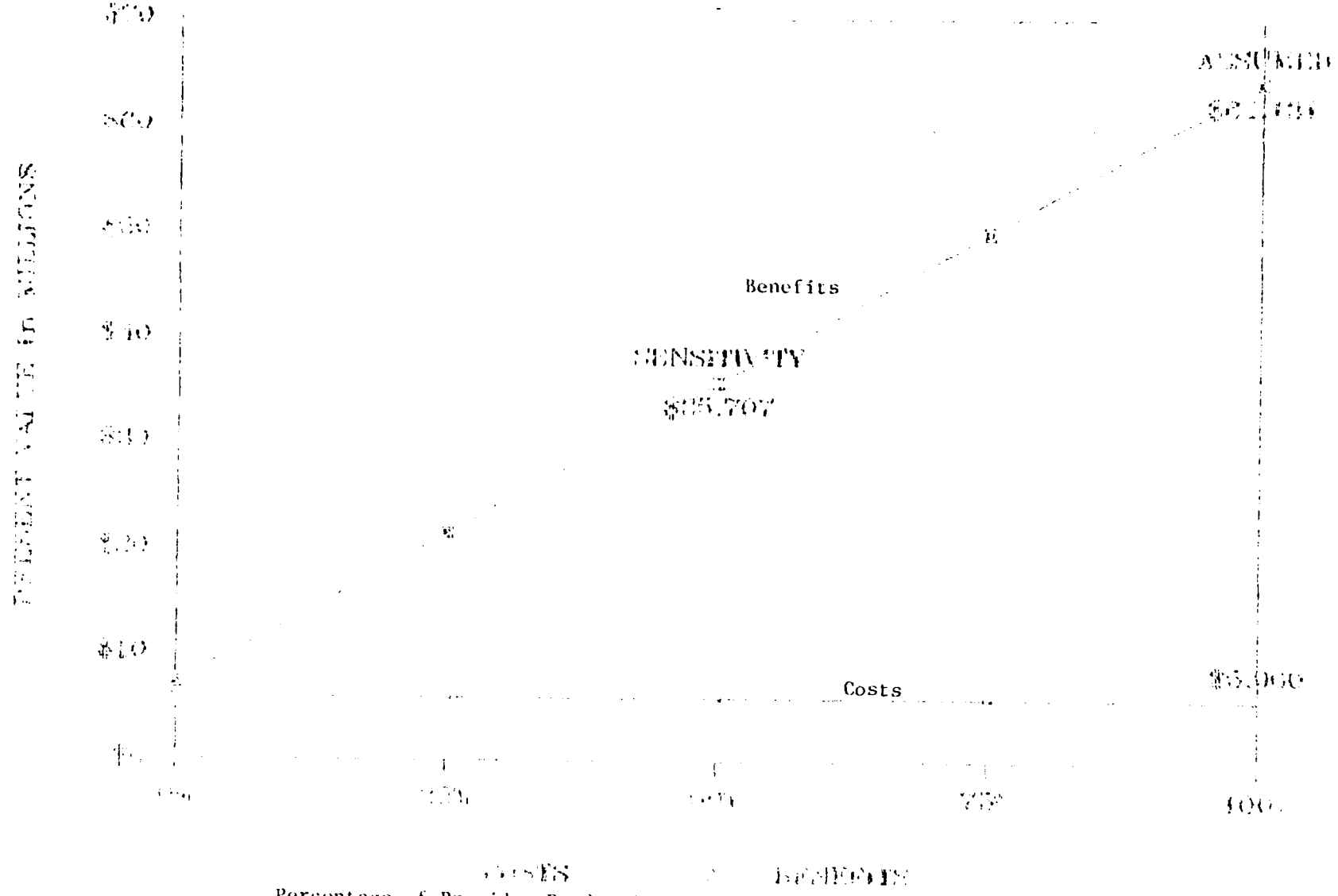
C. ECONOMIC ASSUMPTIONS

1. Introduction

Two major economic assumptions were made that affect both the present value lifecycle costs and benefits of the TRIPAS Project. These include the inflation rates and the discount rates used in the

FI : 4

SENSITIVITY OF ESTIMATED PRESENT VALUE LIFECYCLE
BENEFITS OF TRIPAS TO REALIZATION OF PROVIDER PRODUCTIVITY BENEFIT

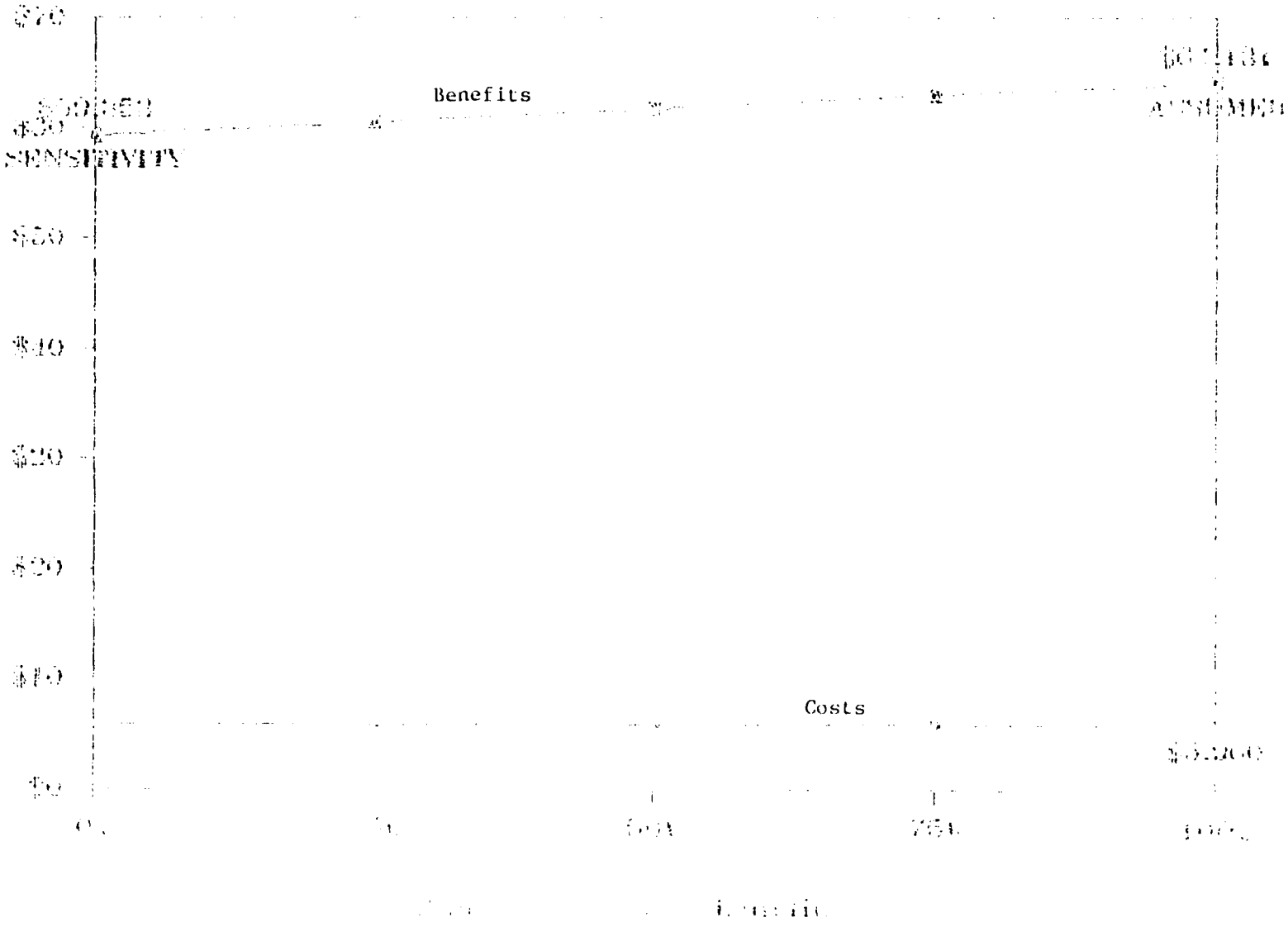


Percentage of Provider Productivity Benefit that is Realized

Note: Discounted to present value (FY 1984) at 10%. Costs and Benefits inflated, as applicable, by DoD Inflation Index.

FIGURE 5

SENSITIVITY OF ESTIMATED PRESENT VALUE LIFECYCLE
BENEFITS OF TRIPAS TO ELIMINATION OF SELECTED ACTIVE-DUTY MILITARY TIME SAVINGS BENEFITS



Note: Discounted to present value (FY 1984) at 10%. Costs and Benefits inflated, as applicable, by DoD Inflation Index

analysis. The sensitivity of the net benefit to changes in these economic assumptions is presented below.

2. Results of Sensitivity Analysis of Economic Assumptions

a. Inflation Rate

Three inflation schemes were utilized in this analysis:

- inflation projections prepared by the Comptroller (Program/Budget), Office of the Assistant Secretary of Defense, for costs of operation and maintenance of all DoD activities, not specifically health care;
- inflation projections by the Health Care Financing Administration (HCFA), U.S. Department of Health and Human Services, for all public and private hospital in the U.S.; and
- hospital industry inflation projections for U.S. hospitals (tends to project higher rates of inflation than HCFA), called here "Rate Control Supplement."

The first of these, the DoD Inflation Index, was utilized in the Base Case analysis.

Table 8 displays and compares the Base Case results with those obtained with the other two inflation indices. As shown, changing the inflation index alone does not alter the basic conclusion that lifecycle benefits exceed lifecycle costs by a substantial margin; in fact, either of the other two inflation indices increases the margin of the net lifecycle benefit.

b. Discount Rate

The Updated Economic Analysis of TRIPAS involves attendant costs and benefits over an extended period of time. In order to compare the time stream of costs in each year with the time stream of benefits in each year, they are discounted to convert the time streams into a common basis--their present value. Discounting reflects the opportunity foregone by investing in the program under consideration (i.e., the opportunity cost). The choice of discount rate can affect the outcome of the economic analysis.

In the Base Case analysis of TRIPAS, the DoD-mandated discount rate of 10 percent was used. Figure 6 displays the effect of using

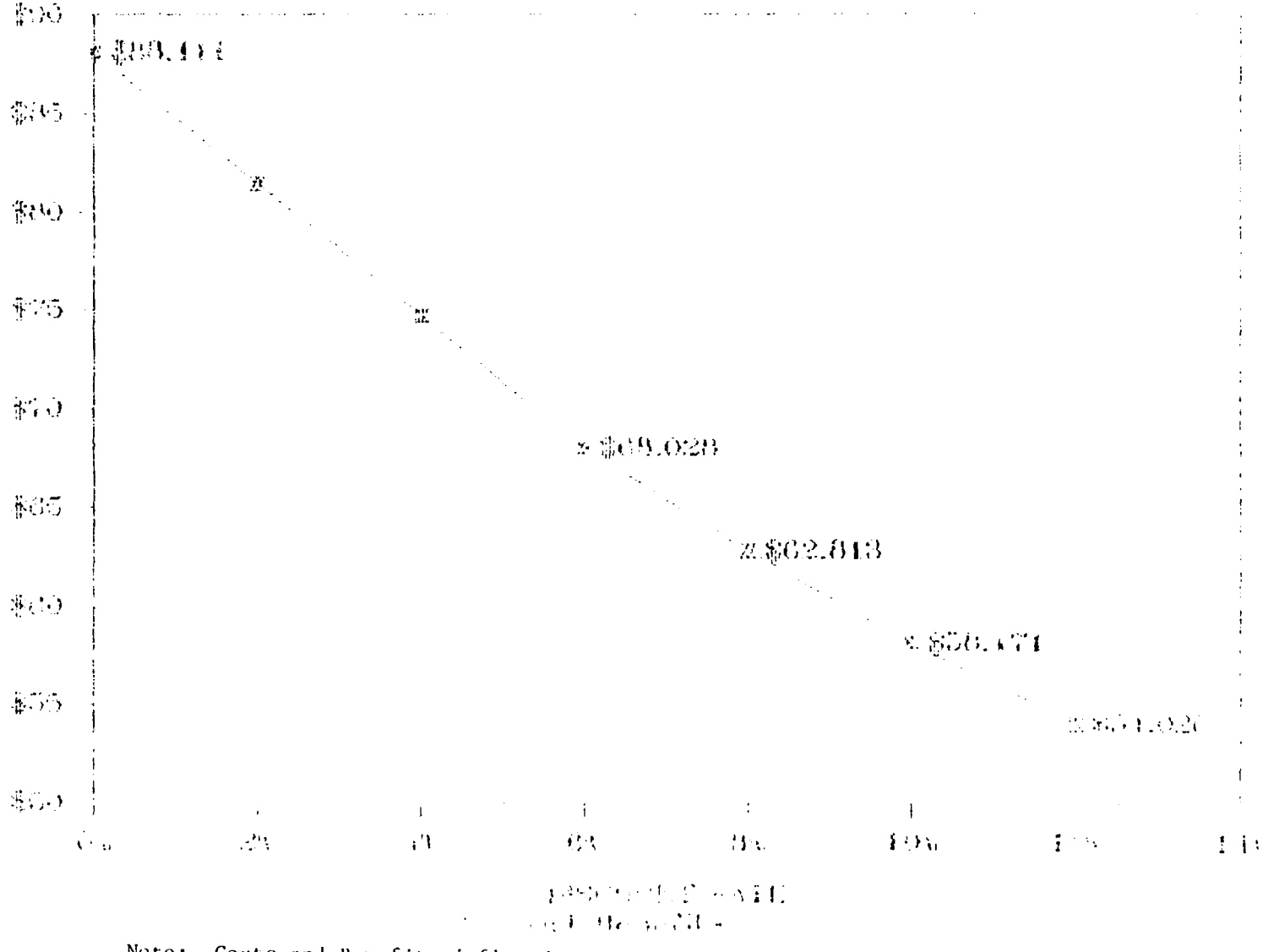
TABLE 8

SENSITIVITY OF NET PRESENT VALUE LIFECYCLE COSTS
AND BENEFITS OF TRIPAS TO ASSUMPTIONS REGARDING INFLATION

Inflation Index	Present Value of Benefits (Million Dollars)	Present Value of Costs (Million Dollars)	Net Present Value Benefits (Million Dollars)
DoD	64.1	5.0	58.2
Health Care Finance Administration (HCFA)	71.6	6.1	65.5
Rate Control	79.8	6.1	73.6

FIGURE 6

SENSITIVITY OF PRESENT VALUE LIFECYCLE
NET BENEFITS OF TRIPAS TO ASSUMED DISCOUNT RATES



Note: Costs and Benefits inflated, as applicable, by DoD Inflation Index

* Net Benefits equal Total Benefits minus Total Costs

lower discount rates, which are commonly employed in economic analysis of public programs, and of using rates higher than 10 percent. As would be expected, the lower discount rates yield a higher net present value benefit. However, at all discount rates commonly employed in this type of analysis, the benefits exceed the costs by a substantial margin.

D. RESULTS OF SENSITIVITY ANALYSIS

None of the sensitivity analyses conducted on the benefit assumptions results in a decrease of greater than 45 percent of total lifecycle benefits. In all cases estimated benefits exceed estimated costs by close to $30 million. Similarly, varying the economic assumptions employed did not alter the finding of a substantial estimated net benefit. Therefore, the sensitivity analysis indicates that the conclusion that the net lifecycle benefits of TRIPAS in five candidate sites exceed net lifecycle costs is insensitive to the major benefit and economic assumptions tested.

REFERENCES

1. Martin Marietta Data Systems, *Contract No.* MDA903-83-D-0030, Modification P0005, March 1983.

2. Arthur D. Little, Inc., and National Capital Systems, Inc., Report of the Interim Evaluation of the Patient Appointment and Scheduling Systems at Brooke Army Medical Center and Ehrling Bergquist USAF Regional Hospital, October 1982.

3. Arthur D. Little, Inc., and National Capital Systems, Inc., Evaluation Report of the Patient Appointment and Scheduling System at USAF Medical Center, Keesler Air Force Base, February 1984.

4. TRIMIS Medical Review Group. Initial Project Objectives and Evaluation Criteria. TRIMIS Program Office, Bethesda, Maryland, April 1978.

APPENDIX A. BENEFIT MODEL

I. INCREASED AVAILABILITY OF PROVIDER TIME

BENEFIT: Increased Patient Productivity: Visits per Provider hour: Physician Productivity

FORMULA: .078 hours per visit x total visits x $/physician hour

REASON FOR CHANGE:

The TRIPAS System, through improved scheduling, schedules more patients per physician and thus increases the utilization of provider time. The system improves the efficiency of obtaining available appointments. In addition, the TRIPAS System, through workload reporting, provides clinic chiefs and administrators with more management information to use in ensuring utilization of physician time.

CALCULATION OF BENEFIT:

Data obtained from Keesler AFB before and after the implementation of TRIPAS demonstrate a statistically significant increase in the average number of patients seen per provider hour. Data collected from 23 clinics in October 1982, prior to the installation of TRIPAS show that physicians saw 19,406 patients in 10,523 hours. This is the equivalent of 1.84 visits per hour. Following TRIPAS, in October 1983, data collected from the same 23 clinics show that physicians saw 21,366 patients in 9,924 hours. This is the equivalent of 2.15 visits per hour. The increase of .31 (2.15-1.84) visits per hour is statistically significant at the .01 level, based on a two-tailed t-test. For use in the benefit algorithm, the inverse of visits per hour was used (hours/visit). The mean hours per visit for the same data are .542 for 1982 and .464 for 1983. This represents the change of .078 hours per visit used in the algorithm.

[1] Arthur D. Little, Inc., Evaluation of the TRIPAS system at USAF Medical Center, Keesler AFB, contract MDA 903-81-C-0209, Final Report to the TRIMIS Program Office, February 14, 1984.

BENEFIT: Reduction in Physician Time: Administration of Clinics

FORMULA: 20 hours/mos x 12 mos/year x $/physician hour

REASON FOR CHANGE:

Workload reports generated by the TRIPAS system provide clinic chiefs with valuable information that either was previously unavailable or had to be obtained through manual calculations. Ready access to workload data results in time savings for the clinical chiefs.

CALCULATION OF BENEFIT:

Information obtained during the TRIPAS Evaluation from interviews with clinical chiefs and the hospital commander indicate that approximately one hour per month is saved per clinic due to the availability of workload data generated by TRIPAS.[1] It was assumed that on average MTFs have 20 major clinics with a clinical chief.

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[1] Arthur D. Little, Inc., Evaluation of the TRIPAS System at USAF Medical Center, Keesler AFB, Contract MDA 903-81-C-0209, Final Report to the TRIMIS Program Office, February 14, 1984.

II. INCREASED AVAILABILITY OF OTHER MTF PERSONNEL TIME

BENEFIT: Reduction in Clerk Time: Appointment Scheduling

FORMULA: .13 minutes/call x 1.12 calls/visit x total visits x $/clerk minute

REASON FOR CHANGE:

With TRIPAS, unlike under a manual system, appointment clerks have immediate access to information regarding the next available appointment with any provider or clinic. The software also permits a clerk to examine a given day's list of appointments and openings. If a patient is registered, the patient information needed to make an appointment (given orally under a manual system) automatically appears on the screen. Thus, significant time savings can be realized in booking appointments. Cancellations and changes in provider schedules can also be accomplished more easily because they do not require manual lookup or changing.

CALCULATION OF BENEFIT:

Data obtained during the evaluation of TRIPAS indicate that the time spent, on average, for telephone transactions related to making an appointment decreased by 7.7 seconds (or .13 minutes), from 67.2 to 59.5 seconds following implementation of the TRIPAS System. Data also indicate that there are 1.84 calls or transactions per appointment booked and .608 appointments booked per visit, resulting in 1.12 calls per visit.[1]

[1] Arthur D. Little, Inc., Evaluation of the TRIPAS System at USAF Medical Center, Keesler AFB., Contract MDA 903-81-C-0209. Final Report to the TRIMIS Program Ofice, February 14, 1984.

BENEFIT: Reduction in Clerk Time: Medical Records

FORMULA: 1 hr/day x 250 days/year x $/clerk hour

REASON FOR CHANGE:

The implementation of TRIPAS results in a reorganization of the process used in the Medical Records Department. With TRIPAS, automated pull lists are generated as output and result in increased effectiveness and efficiency in pulling medical records for the next day's clinic appointments. The pull lists are better organized and more legible than the hand-written requisition forms used under the manual system.

CALCULATION OF BENEFIT:

Based on interviews with personnel in the Medical Records Department as part of the TRIPAS evaluation, it was learned that approximately one hour each day is saved by medical records personnel who pull medical records.[1] This time savings is attributed to the use of an automated pull list generated by TRIPAS. It was assumed that there are 250 workdays a year when the automated pull list would be used.

[1] Arthur D. Little, Inc., Evaluation of the TRIPAS System at USAF Medical Center, Keesler AFB., Contract MDA 903-81-C-0209. Final Report to the TRIMIS Program Office, February 14, 1984.

BENEFIT: Reduction in Clerk Time: UCA Reporting

FORMULA: 3 hours/mos x 12 mos/year x $/clerk hour

REASON FOR CHANGE:

TRIPAS generates workload by clinic on a daily and monthly basis. The availability of this information results in time savings because UCA clerks no longer have to generate these reports by hand.

CALCULATION OF BENEFIT:

Information obtained from interviews of UCA Staff in the Resource Management Office, as part of the TRIPAS evaluation indicates that UCA clerks save approximately 3 hours per month as a result of the PAS workload reporting.[1]

[1] Arthur D. Little, Inc., Evaluation of the TRIPAS System at USAF Medical Center, Keesler AFB., Contract MDA 903-81-C-0209. Final Report to the TRIMIS Program Ofice, February 14, 1984.

III. INCREASED EFFECTIVE TIME OF ACTIVE-DUTY MILITARY PERSONNEL

BENEFIT: Reduction in Non-Effective Active-Duty Time: Reduction in Telephone Queue to Make an Appointment

FORMULA: .41 min/call x 1.12 calls/visit x total active-duty visits x $/active-duty minute x 50%

REASON FOR CHANGE:

Both the average waiting time in a telephone queue to schedule an appointment and the percentage of time a queue existed decreased following the implementation of the PAS System. For active duty personnel, this results in a reduction in non-effective time spent waiting to book an appointment.

CALCULATION OF BENEFIT:

Data obtained during the evaluation of the TRIPAS System indicate that the percentage of time that a telephone queue existed for making an appointment was reduced by 13% percentage points (from 36% to 23% of the time) following implementation of the TRIPAS System. In addition, the average waiting time in the queue for the caller, when the queue existed, decreased by 40.7 seconds (from an average of 116.6 to 75.9 seconds) following implementation of TRIPAS. The resulting difference is equal to (.36 x 116.6) minus (.23 x 75.9) or (42-17.5), resulting in an average reduction of 24.5 seconds or .41 minutes. Data from the TRIPAS evaluation also indicate that, on average, there are 1.84 calls or transactions per appointment booked and .608 appointments booked per visit, resulting in 1.12 calls per visit.[1] Active duty visits represent approximately 38% of total visits.[2] It was also assumed that only 50% of active-duty personnel book their appointments while on duty.

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[1] Arthur D. Little, Inc., Evaluation of the TRIPAS System at USAF Medical Center, Kessler AFB, Contract MDA 903-81-C-0209, Final Report to the TRIMIS Program Office, February 14, 1984.

[2] Selected Medical Care Statistics, Quarter ending June 30, 1983, Directorate for Information Operations and Reports (DIOR), The Pentagon, Washington, D.C.

BENEFIT: Reduction in Non-Effective Active-Duty Time: Appointment Scheduling

FORMULA: .13 minutes/call x 1.12 calls/visit x total active-duty visits x $/active-duty minute x 50%

REASON FOR CHANGE:

See Reduction in Clerk Time: Appointment Scheduling

CALCULATION OF BENEFIT:

See Reduction in Clerk Time: Appointment Scheduling. It was also assumed that only 50% of active-duty personnel book their appointments while on duty.

BENEFIT: Reduction in Non-Effective Active-Duty Time: Multiple Appointments Scheduled for the Same Day

FORMULA: 2.9% x 30 min/visit x total active-duty visits x $/active-duty minute

REASON FOR CHANGE:

The TRIPAS System greatly increases the ease with which multiple appointments can be scheduled. Scheduling clerks have ready access to information on available appointments for all clinics for all days. This results in an increase in the number of patients with same day multiple visits and thus, fewer unnecessary trips to treatment facilities.

CALCULATION OF BENEFIT:

Data obtained during the TRIPAS evaluation from outpatient questionnaires indicate that 2.9 percent more patients had multiple appointments following TRIPAS (6.3% to 9.2% after TRIPAS implementation).[1] It is assumed that each of these patients were saved one 30-minute round-trip as a result of same-day multiple appointment.

[1] Arthur D. Little, Inc., Evaluation of the TRIPAS System at USAF Medical Center, Kessler AFB, Contract MDA 903-81-C-0209, Final Report to the TRIMIS Program Office, February 14, 1984.

BENEFIT: Reduction in Non-Effective Active-Duty Time: Retrieving Medical Record

FORMULA: 2% x total active-duty visits x 10 minutes/visit x $/active duty minute x 50%

REASON FOR CHANGE:

The installation of TRIPAS results in a reorganization of the process used in the Medical Records Department. With TRIPAS, the Medical Records Department generates the pull list for each clinic 16 hours in advance of the appointment day. The pull lists are better organized and more legible. This results in fewer records found not to be available at the time of patient appointments. When a medical record is not available, a patient is usually asked to retrieve it from the Medical Records Department. Thus, the number of patients asked to retrieve records would be reduced.

CALCULATION OF BENEFIT:

Data obtained during the evaluation of TRIPAS indicate that medical records were available for 2% more patients following implementation of TRIPAS (85% to 87% post implementation).[1] It is assumed that the time spent retrieving a medical record is 10 minutes. It is further assumed that only 50% of the active duty personnel would actually return to duty 10 minutes earlier, as a result of the time-saving.

[1] Arthur D. Little, Inc., Evaluation of the TRIPAS System at USAF Medical Center, Kessler AFB, Contract MDA 903-81-C-0209, Final Report to the TRIMIS Program Office, February 14, 1984.

BENEFIT: Reduction in Non-Effective Active-Duty Time: Patient Waiting Time in Clinics

FORMULA: 4 minutes/visit x total active duty visits x $/activity-duty minute x 50%

REASON FOR CHANGE:

Improved scheduling of patient visits following the implementation of TRIPAS results in shorter patient waiting times. Physicians report that the automated schedules result in better organization and anticipation of the days schedule, more records and x-rays available and thus, less patient waiting time. Wasted active-duty time spent waiting for appointments is non-effective time.

CALCULATION OF BENEFIT:

Data obtained during the TRIPAS evaluation indicate that, for all patients, the average waiting time decreased by 2.9 minutes (from 29.3 minutes to 26.4 minutes following the implementation of TRIPAS). For active-duty patients, the average waiting time decreased by 4 minutes (from 28 to 24 minutes) per visit. It was assumed that 50% of the active-duty patients would return to duty earlier, as a result.

[1] Arthur D. Little, Inc., Evaluation of the TRIPAS System at USAF Medical Center, Kessler AFB, Contract MDA 903-81-C-0209, Final Report to the TRIMIS Program Office, February 14, 1984.

APPENDIX B. COST MODEL

I. Overview

There are three types of cost algorithms in the cost model used to project TRIPAS costs to five candidate sites over a system lifecycle of eight years. Certain cost items are specified as a fixed value across sites. Certain cost items are specified for each site, but vary across sites. Other costs are estimated on the basis of parameters that are specific to the number of peripheral devices at each site. Table B-1 presents the specific cost algorithms and timing of the costs for TRIPAS. Table B-2 presents the peripheral requirements for the five candidate sites. All costs are based on the TRIPAS contract to Martin Marietta Data Systems* and estimates provided by TPO.

II. Cost Algorithms

23 cost algorithms are defined in Table B-1. The costs have been divided into four categories: 1) hardware; 2) software, 3) communications, and 4) other. Within each cost category, the costs have been divided into non-recurring (i.e., on-time) and recurring (i.e., incurred repeatedly on a specific schedule over a given time period).

1. Hardware Costs

Thirteen costs are included under hardware. Only two of these are non-recurring costs covering the purchase of a medical treatment recording card and the installation of hardware at each facility. The recurring costs include the lease-to-ownership costs for acquiring the majority of the hardware and the maintenance of the hardware over the system lifetime of 8 years at each site.

a. Non-recurring Costs

One Medical Treatment Recording Card, the costs of which include transportation, installation and documentation, is purchased for each site at a cost of $25,000 per unit. The fixed, one-time cost of installing all hardware is $25,000 for four sites and $44,000 for one site with an upgraded system.

* TPO Contract No. MDA903-82-D-0030, Modification P00005, as of April, 1983.

TABLE B-1

COST ALGORITHMS

Cost Category	Timing	Algorithm
HARDWARE		
Non-Recurring		
Medical Treatment Recording Card (MTRC)	One-Time	$25,000 per site
Hardware Installation	One-Time	Varies by site
Recurring		
Central Processing Unit/ Main Memory	Monthly for first 48 months	Varies by site
KVD Terminal	Monthly for first 48 months	$46 x # terminals ($53.65 for up-graded terminals)
Online Storage	Monthly for first 48 months	Varies by site
Offline Storage	Monthly for first 48 months	$270 per site (except Darnell)
Line Printer	Monthly for first 48 months	$215 per site
Character Printers	Monthly for first 48 months	$46 x # printers (53.65 for up-graded printers)
Communications Interface	Monthly for first 48 months	Varies by site
Operators Console	Monthly for first 48 months	$53 per site
Principal Period of Maintenance	Monthly over system lifecycle	Varies by site

TABLE B-1 (Continued)

COST ALGORITHMS

Cost Category	Timing	Algorithm
Outside PPM	Monthly over system lifecycle	$200 per site
PPM for MTRC	Monthly over system lifecycle	$250 per site
SOFTWARE		
Non-Recurring		
Fee & License	One-Time	$75,000 per site
Documentation	One-Time	Varies by site ($2,000 for 4 sites; $3000 for 1 site)
Recurring		
Maintenance	Monthly over system lifecycle	$2500 per site
COMMUNICATION		
Non-Recurring		
Equipment	One-Time	Varies by site
Recurring		
Maintenance	Monthly over system lifecycle	10% of one-time cost of communication equipment at 3 sites; varies in other 2 sites

TABLE B-1 (Continued)

COST ALGORITHMS

Cost Category	Timing	Algorithm
OTHER		
Non-Recurring		
Training	One-Time	Varies by site
System Implementation	One-Time	$2,500 per site
Site Preparation	One-Time	Varies by site
Recurring		
Supplies	Annually	Varies by site
Base Overhead (space)	Annually	Varies by site
Computer Support Personnel	Annually	$5,815.50 per site

TABLE B-2

CONFIGURATION OF PERIPHERALS IN TRIPAS SITES

Number of Peripherals	Site				
	1	2	3	4	5
KVDT	50	56	28	31	72
KVDT Upgraded	18	0	0	0	0
Character Printers	2	10	7	4	9
Character Printers Upgraded	9	0	0	0	0

b. Recurring Costs

The majority of the hardware for TRIPAS is purchased under a lease-to-ownership plan. For the five systems included under this economic analysis the title of the systems hardware passes to the government at the end of 48 monthly payments. Included in the lease-to-ownership plan for each site are one Central Processing Unit/Main Memory which ranges in cost from $1,223 per month to $4,455 per month; a specified number of Keyboard Visual Display Terminals (KVDTs) which cost $46 per month per unit and $53.65 per month per unit for the upgraded system; one On-line Intermediate Access Storage Unit (IAS) which ranges in cost from $650 to $1,484 per month; one offline storage unit in all but the upgraded site, at a cost of $270 per month; one line printer at a cost of $215 per month; a specified number of character printers at $46 per month per unit and $53.65 per month per unit for the upgraded system; one communication interface at a cost ranging from $435 to $979 per month per site; and, an operators console at a cost of $53 per month.

Hardware Maintenance costs vary from site to site for the Principle Period of Maintenance and range from $1,662.26 to $4,559.88 per month per site. The fixed cost of $200 per month for the Outside PPM and the PPM costs are inflated on a different schedule than the DoD Inflation Index, as specified in the contract. These costs are specified in 1982 dollars in the contract and are inflated according to the following:

Year	Inflation Factor
1983	1.05
1984	1.07
1985-87	1.10
1980-90	1.12
1991-93	1.14

Maintenance of the MTRC is $250 per month.

2. Software Costs

Only three costs are included under software. The non-recurring costs include a one-time charge of $75,000 per site for the software

license and fee and a $2,000 cost for documentation. Software maintenance, which is the only software recurring cost, is $2,500 per month per site.

3. Communications Costs

There is one non-recurring and one recurring cost for communications equipment and maintenance, respectively. The cost of communications equipment ranges from $107,800 at one site to between $60,000 to $75,000 at the other four sites. Maintenance of communications equipment is $8,000 at one, 10% of equipment costs at three sites, and included in the one-time cost for communications equipment at one site.

4. Other Costs

Six costs are included in the Other Costs category. The three non-recurring costs are for training, site preparation, and system implementation. Training costs vary across sites and range from $10,746 to $18,130 per site. Site preparation costs also vary across sites and range from $30,000 to $60,000 per site. System implementation is a one-time cost of $2,500 per site. Recurring costs include annual costs for supplies, overhead (space) and support personnel. Supply costs range from $7,068 to $15,046 per site per year and overhead costs range from $294 to $626 per site per year. Support personnel needed for TRIPAS were assumed to be the equivalent of one-quarter of a full-time (.25 FTE) Technician (Military Rank E-4). The FTE salary of $23,262 for a technician was used and includes basic pay from annual composite salary schedule tables (FY 83) and are adjusted by leave allowance of 20.9% and 38% fringes plus quarters and other special pays.

APPENDIX C. DETAILED RESULTS

Tables C-1 and C-2 present the detailed results of the benefits and costs of TRIPAS in 5 candidate sites in each project year. All results are discounted to present value (1984) at 10%; applicable benefit and cost items are inflated to the DoD Inflation Index.

TABLE C-1

TOTAL PRESENT VALUE LIFECYCLE BENEFITS OF TRIPAS IN 5 CANDIDATE SITES: DETAILED RESULTS BY PROJECT YEAR

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
INCREASED AVAILABILITY of MTF STAFF TIME										
Clerk -- MR	$1,066	$9,310	$9,658	$9,175	$8,716	$8,280	$7,866	$7,473	$3,431	$64,974
Clerk -- UCA	$154	$1,341	$1,391	$1,321	$1,255	$1,192	$1,133	$1,076	$494	$9,356
Clerk -- Appointment Scheduling	$9,446	$66,021	$69,080	$65,626	$62,345	$59,227	$56,266	$53,453	$23,731	$465,195
YEARLY SUB-TOTALS	$10,666	$76,671	$80,128	$76,122	$72,316	$68,700	$65,265	$62,002	$27,656	$539,525
INCREASED EFFECTIVE TIME of ACTIVE-DUTY PERSONNEL										
ADT -- Multiple Appointments	$35,059	$245,036	$256,391	$243,572	$231,393	$219,826	$208,832	$198,391	$88,077	$1,726,575
ADT -- Waiting Time	$80,596	$563,301	$589,405	$559,935	$531,938	$505,341	$480,074	$456,071	$202,477	$3,969,139
ADT -- MR	$4,030	$28,165	$29,470	$27,997	$26,597	$25,267	$24,004	$22,804	$10,124	$198,457
ADT -- Queue	$9,268	$64,780	$67,782	$64,393	$61,173	$58,114	$55,209	$52,448	$23,285	$456,451
ADT -- Appointment Scheduling	$3,143	$21,969	$22,987	$21,837	$20,746	$19,708	$18,723	$17,787	$7,897	$154,796
YEARLY SUB-TOTALS	$132,096	$923,250	$966,036	$917,734	$871,847	$828,255	$786,842	$747,500	$331,859	$6,505,418
INCREASED AVAILABILITY of PROVIDER TIME										
Physician -- Administering	$3,891	$33,979	$35,249	$33,486	$31,812	$30,221	$28,710	$27,275	$12,524	$237,146
Physician -- Productivity	$1,150,357	$8,068,065	$8,441,956	$8,019,858	$7,618,864	$7,237,921	$6,876,024	$6,532,223	$2,900,040	$56,849,310
YEARLY SUB-TOTALS	$1,158,248	$8,102,044	$8,477,205	$8,053,344	$7,650,676	$7,268,142	$6,904,734	$6,559,498	$2,912,564	$57,086,456
YEARLY BENEFITS	$1,301,009	$9,101,965	$9,523,369	$9,047,200	$8,594,839	$8,165,097	$7,756,841	$7,368,999	$3,272,079	$64,131,400

SOURCE: Department of Defense data & Arthur D. Little, Inc. estimates

Revised: 02-01-1991

TABLE C-2

TOTAL PRESENT VALUE LIFECYCLE COSTS OF TRIPAS IN 5 CANDIDATE SITES: DETAILED RESULTS BY PROJECT YEAR

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
HARDWARE										
Non - Recurring										
Medical Treatment Recording Card	$125,000	$0	$0	$0	$0	$0	$0	$0	$0	$125,000
Hardware Installation	$144,000	$0	$0	$0	$0	$0	$0	$0	$0	$144,000
Recurring										
Equipment	$243,985	$432,835	$411,587	$391,008	$171,969	$0	$0	$0	$0	$1,651,384
PP Maintenance	$100,591	$167,239	$152,035	$138,214	$127,934	$116,303	$105,730	$97,835	$38,944	$1,044,826
Outside PFM	$6,634	$12,000	$10,909	$9,917	$9,180	$8,345	$7,587	$7,020	$3,085	$74,676
MTRC Maintenance	$7,750	$14,291	$13,589	$12,910	$12,364	$11,651	$11,069	$10,515	$4,828	$98,868
YEARLY SUB-TOTALS:	$627,961	$626,365	$588,121	$552,049	$321,346	$136,300	$124,385	$115,370	$46,857	$3,138,755
SOFTWARE										
Non - Recurring										
Software Licence & Fee	$375,000	$0	$0	$0	$0	$0	$0	$0	$0	$375,000
Documentation	$10,000	$0	$0	$0	$0	$0	$0	$0	$0	$10,000
Recurring										
Software Maintenance	$77,500	$142,909	$135,894	$129,099	$122,644	$116,512	$110,686	$105,152	$48,282	$988,677
YEARLY SUB-TOTALS	$462,500	$142,909	$135,894	$129,099	$122,644	$116,512	$110,686	$105,152	$48,282	$1,373,677
COMMUNICATION										
Non - Recurring										
Communication Equipment	$375,800	$0	$0	$0	$0	$0	$0	$0	$0	$375,800
Recurring										
Communication Equipment	$14,167	$26,200	$24,914	$23,668	$22,485	$21,360	$20,292	$19,278	$8,879	$181,244
YEARLY SUB-TOTALS	$389,967	$26,200	$24,914	$23,668	$22,485	$21,360	$20,292	$19,278	$8,879	$557,044
OTHER										
Non - Recurring										
Training	$71,143	$0	$0	$0	$0	$0	$0	$0	$0	$71,143
System Implementation	$12,500	$0	$0	$0	$0	$0	$0	$0	$0	$12,500
Site Preparation	$240,000	$0	$0	$0	$0	$0	$0	$0	$0	$240,000
Recurring										
Supplies	$29,105	$52,019	$49,465	$46,992	$44,642	$42,410	$40,290	$38,275	$16,979	$360,177
Overhead (space)	$1,211	$2,165	$2,058	$1,955	$1,858	$1,765	$1,677	$1,593	$706	$14,988
Support Personnel	$15,025	$27,705	$26,345	$25,028	$23,777	$22,588	$21,458	$20,385	$9,360	$191,672
YEARLY SUB-TOTALS	$368,983	$81,889	$77,869	$73,975	$70,277	$66,763	$63,425	$60,253	$27,046	$890,479
YEARLY COSTS	$1,849,411	$877,363	$826,797	$778,791	$536,751	$340,935	$318,789	$300,053	$131,064	$5,959,955

SOURCE Department of Defense data & Arthur D Little, Inc estimates

Revised 07-01-1991

APPENDIX D. SENSITIVITY ANALYSIS

The effect of major assumptions on the estimated benefits of TRIPAS is given in Table D-1. The sensitivity of results to changes in two assumptions is shown:

- for provider productivity, 50% of estimated benefits realized, and
- for increased effective time of active duty personnel, no benefit realized for time savings less than 15 minutes.

Tables D-2 through D-5 present the results of the sensitivity analysis to charges in inflation rates.

Tables D-6 through D-13 present the results of the sensitivity analysis to charges in discount rates.

TABLE D-1

SENSITIVITY OF PRESENT VALUE LIFECYCLE BENEFITS OF TRIPAS TO MAJOR ASSUMPTIONS

Benefit: Source of Benefit	Change from Base Case (Millions of $)	
	Provider Productivity	Small Active-Duty Time Savings[c]
Increased Availability of Provider Time		
- Increased Physician Productivity: visits per hour	-28.42	0
- Reduction in Physician Time: Administration of Clinics	0	0
SUBTOTAL	-28.42	0
Increases Availability of Other Personnel Time		
- Reduction in Clerk Time: Appointment Scheduling	0	0
- Reduction in Clerk Time: Medical Records	0	0
- Reduction in Clerk Time: UCA Reporting	0	0
SUBTOTAL	0	0
Increased Effective Time of Active-Duty Military Personnel		
- Reduction in Non-Effective Active-Duty Time: Reduction in Telephone queue to make an Appointment	0	-.46
- Reduction in Non-Effective Active-Duty Time: Appointment Scheduling	0	-.15
- Reduction in Non-Effective Active-Duty Time: Multiple Appointments Scheduled for the Same Day	0	0

TABLE D-1 (Cont.)
SENSITIVITY OF PRESENT VALUE LIFECYCLE BENEFITS OF TRIPAS TO MAJOR ASSUMPTIONS

Benefit: Source of Benefit	Change from Base Case (Millions of $)	
- Reduction in Non-Effective Active-Duty Time: Retrieving Medical Record	0	-.20
- Reduction in Non-Effective Active-Duty Time: Waiting Time in Clinics	0	-4.78
SUBTOTAL	0	-4.78
TOTAL CHARGE	-28.42	-4.78
Resulting Total Benefit	35.71	59.35
Resulting Net Benefit	29.75	53.39

PAS ECONOMIC ANALYSIS --ANALYSIS OF BENEFITS--- TABLE D-2

ALL SITES Health Care Financing Administration inflation scenario @ 10 %

LAST INSTALLATION DATE: October, 1984

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
INCREASED AVAILABILITY of NTF STAFF TIME										
Clerk -- MR	$1,066	$9,541	$10,162	$9,922	$9,687	$9,458	$9,235	$9,017	$4,255	$72,342 (0 10 %)
Clerk -- UCA	$154	$1,374	$1,463	$1,429	$1,395	$1,362	$1,330	$1,298	$613	$10,417 (0 01 %)
Clerk -- Appointment Scheduling	$9,446	$67,658	$72,689	$70,971	$69,293	$67,655	$66,056	$64,495	$29,428	$517,692 (0 72 %)
YEARLY TOTALS	$10,666	$78,573	$84,314	$82,321	$80,376	$78,476	$76,621	$74,810	$34,295	$600,452 (0 84 %)
INCREASED EFFECTIVE TIME of ACTIVE-DUTY PERSONNEL										
ADT -- Multiple Appointments	$35,059	$251,349	$270,288	$264,146	$258,142	$252,275	$246,542	$240,939	$110,038	$1,928,778 (2 69 %)
ADT -- Waiting Time	$80,596	$577,813	$621,353	$607,231	$593,430	$579,943	$566,763	$553,882	$252,960	$4,433,971 (6 19 %)
ADT -- MR	$4,030	$28,891	$31,068	$30,362	$29,672	$28,997	$28,338	$27,694	$12,646	$221,699 (0 31 %)
ADT -- Queue	$9,268	$66,449	$71,456	$69,832	$68,244	$66,693	$65,178	$63,696	$29,090	$509,907 (0 71 %)
ADT -- Appointment Scheduling	$3,143	$22,535	$24,233	$23,682	$23,144	$22,618	$22,104	$21,601	$9,865	$172,925 (0 24 %)
YEARLY TOTALS	$132,096	$947,036	$1,018,397	$995,252	$972,632	$950,527	$928,924	$907,812	$414,602	$7,267,280 (10 14 %)
INCREASED AVAILABILITY of PROVIDER TIME										
Physician -- Administering	$3,891	$34,855	$37,159	$36,315	$35,489	$34,683	$33,894	$33,124	$15,646	$265,056 (0 37 %)
Physician -- Productivity	$1,154,357	$8,275,927	$8,899,531	$8,697,269	$8,499,604	$8,306,432	$8,117,649	$7,933,158	$3,623,138	$63,507,040 (88 65 %)
YEARLY TOTALS	$1,158,248	$8,310,781	$8,936,690	$8,733,584	$8,535,093	$8,341,114	$8,151,544	$7,966,282	$3,638,755	$63,772,090 (89 02 %)
YEARLY BENEFITS	$1,301,009	$9,336,390	$10,039,400	$9,811,157	$9,588,101	$9,370,117	$9,157,089	$8,948,904	$4,087,652	$71,639,810

SOURCE Department of Defense data & Arthur D Little, Inc estimates

Revised 12/04/1984

PAS Economic Analysis — ANALYSIS OF COSTS — Page 1 of 1 — TABLE D-3

ALL SITES: Health Care Financing Administration inflation scenario @ 10 %

LAST INSTALLATION DATE: October, 1984

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
HARDWARE										
Non - Recurring										
Medical Treatment Recording Card	$125,000	$0	$0	$0	$0	$0	$0	$0	$0	$125,000 (2.04 %)
Hardware Installation	$144,000	$0	$0	$0	$0	$0	$0	$0	$0	$144,000 (2.35 %)
Recurring										
Equipment	$243,985	$438,618	$423,465	$408,837	$182,735	$0	$0	$0	$0	$1,697,640 (27.73 %)
PP Maintenance	$100,591	$167,239	$152,035	$138,214	$127,934	$116,303	$105,730	$97,835	$38,944	$1,044,826 (17.06 %)
Outside PPH	$6,634	$12,000	$10,909	$9,917	$9,180	$8,345	$7,587	$7,020	$3,085	$74,676 (1.22 %)
MTRC Maintenance	$7,750	$14,482	$13,982	$13,499	$13,032	$12,582	$12,147	$11,729	$5,473	$104,674 (1.71 %)
YEARLY SUB TOTALS	$627,961	$632,338	$600,391	$570,467	$332,881	$137,231	$125,464	$116,593	$47,501	$3,190,816 (52.11 %)
SOFTWARE										
Non - Recurring										
Software Licence $ Fee	$375,000	$0	$0	$0	$0	$0	$0	$0	$0	$375,000 (6.12 %)
Documentation	$10,000	$0	$0	$0	$0	$0	$0	$0	$0	$10,000 (0.16 %)
Recurring										
Software Maintenance	$77,500	$144,818	$139,815	$134,985	$130,322	$125,820	$121,474	$117,277	$54,726	$1,046,738 (17.10 %)
YEARLY SUB TOTALS	$462,500	$144,818	$139,815	$134,985	$130,322	$125,820	$121,474	$117,277	$54,726	$1,431,738 (23.38 %)

PAS ECONOMIC ANALYSIS --ANALYSES OF COSTS-- Page 2 of 2 TABLE D-3 Cont.

ALL SITES Health Care Financing Administration inflation scenario @ 10 %

LAST INSTALLATION DATE October, 1984

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
COMMUNICATION										
Non - Recurring										
Communication Equipment	$375,800	$0	$0	$0	$0	$0	$0	$0	$0	$375,800 (6 14 %)
Recurring										
Communication Equipment	$14,167	$26,550	$25,633	$24,747	$23,892	$23,067	$22,270	$21,501	$10,065	$191,892 (3 13 %)
YEARLY SUB-TOTALS	$389,967	$26,550	$25,633	$24,747	$23,892	$23,067	$22,270	$21,501	$13,065	$567,692 (9 27 %)
OTHER										
Non - Recurring										
Training	$71,143	$0	$0	$0	$0	$0	$0	$0	$0	$71,143 (1 16 %)
System Implementation	$12,500	$0	$0	$0	$0	$0	$0	$0	$0	$12,500 (0 20 %)
Site Preparation	$240,000	$0	$0	$0	$0	$0	$0	$0	$0	$240,000 (3 92 %)
Recurring										
Supplies	$29,105	$52,714	$50,893	$49,135	$47,437	$45,799	$44,216	$42,689	$19,245	$381,232 (6 23 %)
Overhead (space)	$1,211	$2,194	$2,118	$2,045	$1,974	$1,906	$1,840	$1,776	$801	$15,864 (0 26 %)
Support Personnel	$15,025	$28,393	$27,722	$27,066	$26,427	$25,802	$25,192	$24,597	$11,607	$211,830 (3 46 %)
YEARLY SUB-TOTALS	$368,983	$83,300	$80,732	$78,246	$75,838	$73,506	$71,248	$69,062	$31,653	$932,569 (15 23 %)
YEARLY COSTS	$1,849,411	$8[illegible],007	$846,572	$808,445	$562,933	$359,624	$340,456	$324,423	$143,945	$6,122,815

SOURCE Department of Defense data & Arthur D Little, Inc estimates

Revised [illegible]

TABLE D-4

PAS ECONOMIC ANALYSIS --ANALYSIS OF BENEFITS--

ALL SITES Price Control Board inflation scenario @ 10 %

LAST INSTALLATION DATE: October,1984

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
INCREASED AVAILABILITY of MTF STAFF TIME										
Clerk -- MR	$1,066	$9,798	$10,718	$10,747	$10,777	$10,806	$10,836	$10,865	$5,766	$80,860 (0 10 %)
Clerk -- UCA	$154	$1,411	$1,543	$1,548	$1,552	$1,556	$1,560	$1,565	$758	$11,647 (0 01 %)
Clerk -- Appointment Scheduling	$9,446	$69,485	$76,667	$76,876	$77,086	$77,296	$77,507	$77,719	$36,419	$578,502 (0 73 %)
YEARLY SUB-TOTALS	$10,666	$80,695	$88,929	$89,172	$89,415	$89,659	$89,903	$90,148	$42,443	$671,029 (0 84 %)
INCREASED EFFECTIVE TIME of ACTIVE-DUTY PERSONNEL										
ADT -- Multiple Appointments	$35,059	$257,896	$284,552	$285,328	$286,106	$286,886	$287,669	$288,453	$135,169	$2,147,118 (2 69 %)
ADT -- Waiting Time	$80,596	$592,864	$654,142	$655,926	$657,715	$659,509	$661,308	$663,111	$310,734	$4,935,905 (6 19 %)
ADT -- MR	$4,030	$29,643	$32,707	$32,796	$32,886	$32,975	$33,065	$33,156	$15,537	$246,795 (0 31 %)
ADT -- Queue	$9,268	$68,179	$75,226	$75,432	$75,637	$75,844	$76,050	$76,258	$35,734	$567,629 (0 71 %)
ADT -- Appointment Scheduling	$3,143	$23,122	$25,512	$25,581	$25,651	$25,721	$25,791	$25,861	$12,119	$192,500 (0 24 %)
YEARLY SUB-TOTALS	$132,096	$971,703	$1,072,139	$1,075,063	$1,077,995	$1,080,935	$1,083,883	$1,086,839	$509,293	$8,089,947 (10 14 %)
INCREASED AVAILABILITY of PROVIDER TIME										
Physician -- Administering	$2,891	$35,763	$39,120	$39,227	$39,334	$39,441	$39,549	$39,656	$19,220	$295,200 (0 37 %)
Physician -- Productivity	$1,154,357	$8,491,485	$9,369,172	$9,394,724	$9,420,345	$9,446,036	$9,471,797	$9,497,629	$4,450,589	$70,696,140 (88 64 %)
YEARLY SUB-TOTALS	$1,158,248	$8,527,248	$9,408,292	$9,433,951	$9,459,679	$9,485,477	$9,511,346	$9,537,285	$4,469,809	$70,991,330 (89 01 %)
YEARLY BENEFITS	$1,301,009	$9,579,646	$10,569,360	$10,598,190	$10,627,090	$10,656,070	$10,685,130	$10,714,270	$5,021,514	$79,752,310

SOURCE Department of Defense data & Arthur D Little, Inc estimates

Revised 02-06-1984

PAS ECONOMIC ANALYSIS --ANALYSIS OF COSTS-- Page 1 of 2 TABLE D-5

ALL SITES Policy Control Board inflation scenario @ 10 %

LAST INSTALLATION DATE: October, 1984

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
HARDWARE										
Non - Recurring										
Medical Treatment Recording Card	$125,000	$0	$0	$0	$0	$0	$0	$0	$0	$125,000 (2.03 %)
Hardware Installation	$144,000	$0	$0	$0	$0	$0	$0	$0	$0	$144,000 (2.34 %)
Recurring										
Equipment	$243,985	$438,618	$423,165	$408,837	$182,735	$0	$0	$0	$0	$1,697,640 (27.62 %)
PP Maintenance	$100,591	$167,239	$152,035	$138,214	$127,934	$116,303	$105,730	$97,835	$38,944	$1,044,826 (17.00 %)
Outside PPH	$6,634	$12,000	$10,909	$9,917	$9,180	$8,345	$7,587	$7,020	$3,085	$74,676 (1.22 %)
MIRC Maintenance	$7,750	$14,482	$13,982	$13,499	$13,032	$12,582	$12,147	$11,728	$5,473	$104,674 (1.70 %)
YEARLY TOTALS	$627,961	$632,338	$600,391	$570,467	$332,881	$137,231	$125,464	$116,583	$47,501	$3,190,816 (51.92 %)
SOFTWARE										
Non - Recurring										
Software Licence Fee	$375,000	$0	$0	$0	$0	$0	$0	$0	$0	$375,000 (6.10 %)
Documentation	$10,000	$0	$0	$0	$0	$0	$0	$0	$0	$10,000 (0.16 %)
Recurring										
Software Maintenance	$77,500	$144,818	$139,815	$134,985	$130,322	$125,820	$121,474	$117,277	$54,726	$1,046,738 (17.03 %)
YEARLY TOTALS	$462,500	$144,818	$139,815	$134,985	$130,322	$125,820	$121,474	$117,277	$54,726	$1,431,738 (23.29 %)

PAS ECONOMIC ANALYSIS --ANALYSIS OF COSTS-- Page 2 of 2 TABLE D-5 Cont.

ALL SITES Water Control Board inflation scenario @ 10 %

LAST INSTALLATION DATE: October, 1984

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
COMMUNICATION										
Non - Recurring										
Communication Equipment	$375,800	$0	$0	$0	$0	$0	$0	$0	$0	$375,800 (6 11 %)
Recurring										
Communication Equipment	$14,167	$26,550	$25,633	$24,747	$23,892	$23,067	$22,270	$21,501	$10,065	$191,892 (3 12 %)
YEARLY SUB-TOTALS	$389,967	$26,550	$25,633	$24,747	$23,892	$23,067	$22,270	$21,501	$10,065	$567,692 (9 24 %)
OTHER										
Non - Recurring										
Training	$71,143	$0	$0	$0	$0	$0	$0	$0	$0	$71,143 (1 16 %)
System Implementation	$12,500	$0	$0	$0	$0	$0	$0	$0	$0	$12,500 (0 20 %)
Site Preparation	$240,000	$0	$0	$0	$0	$0	$0	$0	$0	$240,000 (3 90 %)
Recurring										
Supplies	$29,105	$52,714	$50,893	$49,135	$47,437	$45,799	$44,216	$42,689	$19,245	$381,232 (6 20 %)
Overhead (space)	$1,211	$2,194	$2,118	$2,045	$1,974	$1,906	$1,840	$1,776	$801	$15,864 (0 26 %)
Support Personnel	$15,025	$29,159	$29,239	$29,319	$29,399	$29,479	$29,559	$29,640	$14,365	$235,182 (3 83 %)
YEARLY SUB-TOTALS	$368,983	$84,067	$82,249	$80,498	$78,810	$77,183	$75,615	$74,105	$34,411	$955,921 (15 55 %)
YEARLY COSTS	$1,849,411	$887,773	$848,089	$810,697	$565,905	$363,301	$344,824	$329,466	$146,702	$6,146,168

SOURCE experimental ... House Data & Arthur D Little, Inc estimates

Revised 12 Dec ...

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PAS [illegible] ANALYSIS --ANALYSIS OF BENEFITS-- TABLE D-6

ALL SITES Department of Defense inflation scenario @ 0 %

LAST INSTALLATION DATE: October, 1984

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
INCREASED AVAILABILITY of HTF STAFF TIME										
Clerk -- MR	$1,066	$10,241	$11,486	$12,211	$12,761	$13,335	$13,935	$14,562	$7,355	$97,153 (0 10 %)
Clerk -- OPA	$154	$1,475	$1,683	$1,758	$1,838	$1,920	$2,007	$2,097	$1,059	$13,990 (0 01 %)
Clerk -- Appointment Scheduling	$9,446	$72,623	$83,587	$87,348	$91,279	$95,386	$99,679	$104,164	$50,869	$694,382 (0 73 %)
YEARLY SUB-TOTALS	$10,666	$84,338	$96,955	$101,318	$105,877	$110,642	$115,621	$120,824	$59,284	$805,524 (0 84 %)
INCREASED EFFECTIVE TIME of ACTIVE-DUTY PERSONNEL										
ADT -- Multiple Appointments	$35,059	$269,540	$310,234	$324,194	$338,783	$354,028	$369,959	$386,607	$188,802	$2,577,205 (2 69 %)
ADT -- Waiting Time	$80,596	$619,631	$713,181	$745,274	$778,811	$813,857	$850,481	$888,753	$434,027	$5,924,610 (6 19 %)
ADT -- MR	$4,030	$30,982	$35,659	$37,264	$38,941	$40,693	$42,524	$44,438	$21,701	$296,231 (0 31 %)
ADT -- Queue	$9,268	$71,258	$82,016	$85,706	$89,563	$93,594	$97,805	$102,207	$49,913	$681,330 (0 71 %)
ADT -- Appointment Scheduling	$3,143	$24,166	$27,814	$29,066	$30,374	$31,740	$33,169	$34,661	$16,927	$231,060 (0 24 %)
YEARLY SUB-TOTALS	$132,096	$1,015,575	$1,168,903	$1,221,504	$1,276,471	$1,333,912	$1,393,938	$1,456,665	$711,370	$9,710,435 (10 14 %)
INCREASED AVAILABILITY of PROVIDER TIME										
Physician -- Administering	$3,891	$37,377	$42,651	$44,570	$46,576	$48,672	$50,862	$53,151	$26,946	$354,594 (0 37 %)
Physician -- Productivity	$1,154,357	$8,874,872	$10,214,770	$10,674,430	$11,154,790	$11,656,750	$12,181,300	$12,729,466	$6,216,494	$84,857,210 (88 64 %)
YEARLY SUB-TOTALS	$1,158,248	$8,912,249	$10,257,420	$10,719,000	$11,201,360	$11,705,420	$12,232,163	$12,782,616	$6,243,440	$85,211,795 (89 01 %)
YEARLY BENEFITS	$1,301,009	$10,012,160	$11,523,280	$12,041,820	$12,583,710	$13,149,970	$13,741,720	$14,360,100	$7,013,953	$95,727,750

SOURCE: Department of Defense data & Arthur D. Little, Inc. estimates

Revised [illegible]

PAS ECONOMIC ANALYSIS --ANALYSIS OF COSTS-- Page 1 of 2 TABLE D-7

ALL SITES Department of Defense inflation scenario @ 0 %

LAST INSTALLATION DATE: October,1984

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
HARDWARE										
Non - Recurring										
Medical Treatment Recording Card	$125,000	$0	$0	$0	$0	$0	$0	$0	$0	$125,000 (1 64 %)
Hardware Installation	$144,000	$0	$0	$0	$0	$0	$0	$0	$0	$144,000 (1 89 %)
Recurring										
Equipment	$243,985	$476,119	$498,020	$520,431	$251,779	$0	$0	$0	$0	$1,990,335 (26 13 %)
PP Maintenance	$100,591	$183,963	$183,963	$183,963	$187,308	$187,308	$187,308	$190,652	$83,490	$1,488,536 (19 54 %)
Outside PFH	$6,634	$13,200	$13,200	$13,200	$13,440	$13,440	$13,440	$13,680	$6,612	$106,844 (1 40 %)
MIRC Maintenance	$7,750	$15,720	$16,443	$17,183	$17,956	$18,764	$19,609	$20,491	$10,350	$144,266 (1 89 %)
YEARLY SUB-TOTALS	$627,961	$689,002	$711,627	$734,777	$470,483	$219,512	$220,356	$224,824	$100,442	$3,998,984 (52 50 %)
SOFTWARE										
Non - Recurring										
Software Licence & Fee	$375,000	$0	$0	$0	$0	$0	$0	$0	$0	$375,000 (4 92 %)
Documentation	$10,000	$0	$0	$0	$0	$0	$0	$0	$0	$10,000 (0 13 %)
Recurring										
Software Maintenance	$77,500	$157,200	$164,431	$171,831	$179,563	$187,643	$196,087	$204,911	$103,497	$1,442,664 (18 94 %)
YEARLY SUB-TOTALS	$462,500	$157,200	$164,431	$171,831	$179,563	$187,643	$196,087	$204,911	$103,497	$1,927,664 (23 99 %)

PAS ECONOMIC ANALYSIS --ANALYSIS OF COSTS-- Page 2 of 2 TABLE D-7 Cont.

ALL SITES Department of Defense inflation scenario @ 0 %

LAST INSTALLATION DATE: October, 1984

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
COMMUNICATION										
Non - Recurring										
Communication Equipment	$375,800	$0	$0	$0	$0	$0	$0	$0	$0	$375,800 (4.93 %)
Recurring										
Communication Equipment	$14,167	$28,820	$30,146	$31,502	$32,920	$34,401	$35,949	$37,567	$19,034	$264,506 (3.47 %)
YEARLY SUB-TOTALS	$389,967	$28,820	$30,146	$31,502	$32,920	$34,401	$35,949	$37,567	$19,034	$640,306 (8.41 %)
OTHER										
Non - Recurring										
Training	$71,143	$0	$0	$0	$0	$0	$0	$0	$0	$71,143 (0.93 %)
System Implementation	$12,500	$0	$0	$0	$0	$0	$0	$0	$0	$12,500 (0.16 %)
Site Preparation	$240,000	$0	$0	$0	$0	$0	$0	$0	$0	$240,000 (3.15 %)
Recurring										
Supplies	$29,105	$57,221	$59,853	$62,546	$65,351	$68,302	$71,376	$74,588	$36,396	$524,747 (6.89 %)
Overhead (space)	$1,211	$2,381	$2,491	$2,603	$2,720	$2,842	$2,970	$3,104	$1,514	$21,836 (0.29 %)
Support Personnel	$15,025	$30,476	$31,878	$33,312	$34,811	$36,378	$38,015	$39,725	$20,065	$279,684 (3.67 %)
YEARLY SUB-TOTALS	$368,983	$90,078	$94,221	$98,461	$102,892	$107,522	$112,361	$117,417	$57,975	$1,149,910 (15.10 %)
YEARLY COSTS	$1,849,411	$965,100	$1,000,425	$1,036,571	$785,858	$549,079	$564,754	$584,719	$280,948	$7,616,863

SOURCE Department of Defense data & Arthur D Little, Inc estimates

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TABLE D-8

PAS ECONOMIC ANALYSIS --ANALYSIS OF BENEFITS--

ALL SITES Department of Defense inflation scenario @ 6 %

LAST INSTALLATION DATE: October, 1984

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
INCREASED AVAILABILITY of MTF STAFF TIME										
Clerk -- MR	$1,066	$9,661	$10,400	$10,253	$10,108	$9,965	$9,824	$9,685	$4,615	$75,576 (0 10 %)
Clerk -- UCA	$154	$1,391	$1,498	$1,476	$1,456	$1,435	$1,415	$1,395	$665	$10,883 (0 01 %)
Clerk -- Appointment Scheduling	$9,446	$68,512	$74,392	$73,339	$72,301	$71,278	$70,270	$69,275	$31,916	$540,730 (0 73 %)
YEARLY SUB-TOTALS	$10,666	$79,564	$86,290	$85,069	$83,865	$82,678	$81,508	$80,355	$37,195	$627,189 (0 84 %)
INCREASED EFFECTIVE TIME of ACTIVE-DUTY PERSONNEL										
ADT -- Multiple Appointments	$35,059	$254,283	$276,107	$272,209	$268,348	$264,550	$260,807	$257,116	$118,457	$2,006,926 (2 69 %)
ADT -- Waiting Time	$80,596	$584,558	$634,728	$625,746	$616,891	$608,162	$599,556	$591,072	$272,314	$4,613,622 (6 19 %)
ADT -- MR	$4,030	$29,228	$31,736	$31,287	$30,845	$30,408	$29,978	$29,554	$13,616	$230,681 (0 31 %)
ADT -- Queue	$9,268	$67,224	$72,994	$71,961	$70,943	$69,939	$68,949	$67,973	$31,316	$530,567 (0 71 %)
ADT -- Appointment Scheduling	$3,143	$22,798	$24,754	$24,404	$24,059	$23,718	$23,383	$23,052	$10,620	$179,931 (0 24 %)
YEARLY SUB-TOTALS	$132,096	$958,090	$1,040,320	$1,025,598	$1,011,085	$996,777	$982,672	$968,766	$446,323	$7,561,727 (10 14 %)
INCREASED AVAILABILITY of PROVIDER TIME										
Physician -- Administering	$3,891	$35,262	$37,959	$37,422	$36,892	$36,370	$35,856	$35,348	$16,843	$275,843 (0 37 %)
Physician -- Productivity	$1,154,357	$8,372,521	$9,091,107	$8,962,460	$8,835,633	$8,710,601	$8,587,337	$8,465,819	$3,900,207	$66,080,140 (88 64 %)
YEARLY SUB-TOTALS	$1,158,248	$8,407,782	$9,129,066	$8,999,882	$8,872,525	$8,746,971	$8,623,193	$8,501,167	$3,917,150	$66,355,990 (89 01 %)
YEARLY BENEFITS	$1,301,009	$9,445,436	$10,255,680	$10,110,550	$9,967,475	$9,826,426	$9,687,373	$9,550,288	$4,400,668	$74,544,900

SOURCE Department of Defense data & Arthur D Little, Inc estimates

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PAS ECONOMIC ANALYSIS --ANALYSIS OF COSTS-- Page 1 of 2 TABLE D-9

ALL SITES Department of Defense inflation scenario @ 6 %

LAST INSTALLATION DATE: October,1984

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
HARDWARE										
Non - Recurring										
Medical Treatment Recording Card	$125,000	$0	$0	$0	$0	$0	$0	$0	$0	$125,000 (1 92 %)
Hardware Installation	$144,000	$0	$0	$0	$0	$0	$0	$0	$0	$144,000 (2 21 %)
Recurring										
Equipment	$243,785	$449,169	$443,236	$436,964	$199,433	$0	$0	$0	$0	$1,772,788 (27 20 %)
PP Maintenance	$100,591	$173,550	$163,726	$154,459	$148,365	$139,967	$132,045	$126,795	$52,377	$1,191,875 (18 29 %)
Outside PPH	$6,634	$12,453	$11,748	$11,083	$10,646	$10,043	$9,475	$9,099	$4,148	$85,328 (1 31 %)
MTRC Maintenance	$7,750	$14,830	$14,634	$14,427	$14,223	$14,022	$13,823	$13,628	$6,494	$113,831 (1 75 %)
YEARLY SUB-TOTALS	$627,961	$650,002	$633,345	$616,933	$372,667	$164,032	$155,343	$149,521	$63,019	$3,432,822 (52 68 %)
SOFTWARE										
Non - Recurring										
Software Licence Fee	$375,000	$0	$0	$0	$0	$0	$0	$0	$0	$375,000 (5 75 %)
Documentation	$10,000	$0	$0	$0	$0	$0	$0	$0	$0	$10,000 (0 15 %)
Recurring										
Software Maintenance	$77,500	$148,302	$146,343	$144,272	$142,231	$140,218	$138,234	$136,278	$64,935	$1,138,313 (17 47 %)
YEARLY SUB-TOTALS	$462,500	$148,302	$146,343	$144,272	$142,231	$140,218	$138,234	$136,278	$64,935	$1,523,313 (23 38 %)

ALL SITES Department of Defense inflation scenario @ 6 %

LAST INSTALLATION DATE: October,1984

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
COMMUNICATION										
Non - Recurring										
Communication Equipment	$375,800	$0	$0	$0	$0	$0	$0	$0	$0	$375,800 (5 77 %)
Recurring										
Communication Equipment	$14,167	$27,189	$26,830	$26,450	$26,076	$25,707	$25,343	$24,984	$11,942	$208,686 (3 20 %)
YEARLY SUB-TOTALS	$389,967	$27,189	$26,830	$26,450	$26,076	$25,707	$25,343	$24,984	$11,942	$584,486 (8 97 %)
OTHER										
Non - Recurring										
Training	$71,143	$0	$0	$0	$0	$0	$0	$0	$0	$71,143 (1 09 %)
System Implementation	$12,500	$0	$0	$0	$0	$0	$0	$0	$0	$12,500 (0 19 %)
Site Preparation	$240,000	$0	$0	$0	$0	$0	$0	$0	$0	$240,000 (3 68 %)
Recurring										
Supplies	$29,105	$53,982	$53,269	$52,515	$51,772	$51,039	$50,317	$47,605	$22,835	$414,439 (6 36 %)
Overhead (space)	$1,211	$2,246	$2,217	$2,185	$2,154	$2,124	$2,094	$2,064	$950	$17,246 (0 26 %)
Support Personnel	$15,025	$28,751	$28,371	$27,970	$27,574	$27,184	$26,799	$26,420	$12,589	$220,681 (3 39 %)
YEARLY SUB-TOTALS	$368,983	$84,979	$83,857	$82,670	$81,500	$80,347	$79,210	$78,089	$36,374	$976,009 (14 98 %)
YEARLY COSTS	$1,849,411	$710,471	$990,374	$870,325	$622,473	$110,304	$398,129	$388,871	$176,270	$6,516,630

SOURCE: Department of Defense data & Arthur D. Little, Inc. estimates

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PAS ECONOMIC ANALYSIS --ANALYSIS OF BENEFITS-- TABLE D-10

ALL SITES Department of Defense inflation scenario @ 8 %

LAST INSTALLATION DATE: October, 1984

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
INCREASED AVAILABILITY of MTF STAFF TIME										
Clerk -- HR	$1,066	$9,482	$10,018	$9,694	$9,380	$9,076	$8,782	$8,497	$3,974	$69,968 (0.10 %)
Clerk -- UCA	$154	$1,365	$1,443	$1,396	$1,351	$1,307	$1,265	$1,224	$572	$10,075 (0.01 %)
Clerk -- Appointment Scheduling	$9,446	$67,243	$71,662	$69,340	$67,093	$64,918	$62,815	$60,779	$27,483	$500,779 (0.73 %)
YEARLY SUB-TOTALS	$10,666	$78,091	$83,123	$80,430	$77,823	$75,301	$72,861	$70,499	$32,029	$580,823 (0.84 %)
INCREASED EFFECTIVE TIME of ACTIVE-DUTY PERSONNEL										
ADT -- Multiple Appointments	$35,059	$249,574	$265,975	$257,356	$249,015	$240,945	$233,137	$225,582	$102,004	$1,858,647 (2.69 %)
ADT -- Waiting Time	$80,596	$573,732	$611,437	$591,622	$572,449	$553,898	$535,947	$518,578	$234,491	$4,272,752 (6.19 %)
ADT -- MT	$4,030	$28,687	$30,572	$29,581	$28,622	$27,695	$26,797	$25,929	$11,725	$213,638 (0.31 %)
ADT -- Queue	$9,268	$65,979	$70,315	$68,037	$65,832	$63,698	$61,634	$59,637	$26,966	$491,366 (0.71 %)
ADT -- Appointment Scheduling	$3,143	$22,376	$23,846	$23,073	$22,326	$21,602	$20,902	$20,225	$9,145	$166,637 (0.24 %)
YEARLY SUB-TOTALS	$132,096	$940,347	$1,002,146	$969,669	$938,244	$907,838	$878,417	$849,950	$384,331	$7,003,039 (10.14 %)
INCREASED AVAILABILITY of PROVIDER TIME										
Physician -- Administering	$3,891	$34,609	$36,566	$35,381	$34,235	$33,125	$32,052	$31,013	$14,504	$255,375 (0.37 %)
Physician -- Productivity	$1,154,357	$8,217,474	$8,757,516	$8,473,707	$8,199,095	$7,933,383	$7,676,282	$7,427,513	$3,358,577	$61,197,910 (88.64 %)
YEARLY SUB-TOTALS	$1,158,248	$8,252,083	$8,794,082	$8,509,088	$8,233,330	$7,966,508	$7,708,334	$7,458,526	$3,373,081	$61,453,270 (89.01 %)
YEARLY BENEFITS	$1,301,009	$9,270,521	$9,879,351	$9,559,186	$9,249,397	$8,949,647	$8,659,612	$8,378,975	$3,789,141	$69,037,140

SOURCE Department of Defense data & Arthur D Little, Inc estimates

Revised 02-06-1985

PAS ECONOMIC ANALYSIS --ANALYSIS OF COSTS-- Page 1 of 2 TABLE D-11

ALL SITES Department of Defense inflation scenario @ 8 %

LAST INSTALLATION DATE: October, 1984

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
HARDWARE										
Non - Recurring										
Medical Treatment Recording Card	$125,000	$0	$0	$0	$0	$0	$0	$0	$0	$125,000 (2.01 %)
Hardware Installation	$144,000	$0	$0	$0	$0	$0	$0	$0	$0	$144,000 (2.31 %)
Recurring										
Equipment	$243,985	$440,851	$426,972	$413,135	$185,065	$0	$0	$0	$0	$1,710,009 (27.48 %)
PM Maintenance	$100,591	$170,336	$157,719	$146,036	$137,677	$127,478	$118,036	$111,244	$45,102	$1,114,218 (17.90 %)
Outside PMM	$6,634	$12,222	$11,317	$10,479	$9,879	$9,147	$8,469	$7,982	$3,572	$79,701 (1.28 %)
MTRC Maintenance	$7,750	$14,556	$14,097	$13,640	$13,198	$12,771	$12,357	$11,956	$5,592	$105,917 (1.70 %)
YEARLY SUB-TOTALS	$627,961	$637,965	$610,105	$583,290	$345,819	$149,396	$138,862	$131,182	$54,266	$3,278,846 (52.68 %)
SOFTWARE										
Non - Recurring										
Software License & Fee	$375,000	$0	$0	$0	$0	$0	$0	$0	$0	$375,000 (6.03 %)
Documentation	$10,000	$0	$0	$0	$0	$0	$0	$0	$0	$10,000 (0.16 %)
Recurring										
Software Maintenance	$77,500	$145,556	$140,973	$136,405	$131,984	$127,707	$123,568	$119,564	$55,916	$1,059,172 (17.02 %)
YEARLY SUB-TOTALS	$462,500	$145,556	$140,973	$136,405	$131,984	$127,707	$123,568	$119,564	$55,916	$1,444,172 (23.20 %)

FAS ECONOMIC ANALYSIS --ANALYSIS OF COSTS-- Page 2 of 2 TABLE D-II Cont.

ALL SITES Department of Defense inflation scenario @ 8 %

LAST INSTALLATION DATE: October,1994

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
COMMUNICATION										
Non - Recurring										
Communication Equipment	$375,800	$0	$0	$0	$0	$0	$0	$0	$0	$375,800 (6 04 %)
Recurring										
Communication Equipment	$14,167	$26,685	$25,845	$25,008	$24,197	$23,413	$22,654	$21,920	$10,283	$194,172 (3 12 %)
YEARLY SUB-TOTALS	$389,967	$26,685	$25,845	$25,008	$24,197	$23,413	$22,654	$21,920	$10,283	$569,972 (9 16 %)
OTHER										
Non - Recurring										
Training	$71,143	$0	$0	$0	$0	$0	$0	$0	$0	$71,143 (1 14 %)
System Implementation	$12,500	$0	$0	$0	$0	$0	$0	$0	$0	$12,500 (0 20 %)
Site Preparation	$240,000	$0	$0	$0	$0	$0	$0	$0	$0	$240,000 (3 86 %)
Recurring										
Supplies	$29,105	$52,982	$51,314	$49,651	$48,042	$46,485	$44,979	$43,521	$19,664	$385,743 (6 20 %)
Overhead (space)	$1,211	$2,205	$2,135	$2,066	$1,999	$1,934	$1,872	$1,811	$818	$16,051 (0 26 %)
Support Personnel	$15,025	$28,218	$27,330	$26,444	$25,587	$24,758	$23,956	$23,179	$10,840	$205,338 (3 30 %)
YEARLY SUB-TOTALS	$368,983	$83,405	$80,780	$78,162	$75,629	$73,178	$70,806	$68,512	$31,322	$930,776 (14 96 %)
YEARLY COSTS	$1,819,411	$893,611	$857,703	$822,864	$577,629	$373,694	$355,890	$341,178	$151,788	$6,223,766

Source: [illegible] Defense data & Arthur D Little Inc estimates

Revised [illegible]

--ANALYSIS --ANALYSIS OF BENEFITS--

...rtment of Defense inflation scenario @ 12 %

...LICATION DATE: October,1984

TABLE D-1.7

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
INCREASED AVAILABILITY of MTF STAFF TIME										
Clerk -- MR	$1,066	$9,143	$9,316	$8,692	$8,110	$7,567	$7,060	$6,587	$2,771	$60,512 (0 10 %)
Clerk -- UCA	$154	$1,317	$1,341	$1,252	$1,168	$1,090	$1,017	$949	$428	$8,714 (0 01 %)
Clerk -- Appointment Scheduling	$9,446	$64,842	$66,635	$64,173	$58,009	$54,125	$50,500	$47,119	$20,545	$435,394 (0 73 %)
YEARLY SUB-TOTALS	$10,666	$75,302	$77,292	$72,116	$67,287	$62,781	$58,577	$54,655	$23,944	$502,619 (0 84 %)
INCREASED EFFECTIVE TIME of ACTIVE-DUTY PERSONNEL										
ADT -- Multiple Appointments	$35,059	$240,660	$247,316	$230,755	$215,303	$200,885	$187,433	$174,882	$76,259	$1,608,546 (2 69 %)
ADT -- Waiting Time	$80,596	$553,242	$568,543	$530,471	$494,948	$461,805	$430,880	$402,027	$175,296	$3,697,808 (6 19 %)
ADT -- MH	$4,030	$27,662	$28,427	$26,524	$24,747	$23,090	$21,544	$20,101	$8,765	$184,890 (0 31 %)
ADT -- Queue	$9,268	$63,623	$65,382	$61,004	$56,919	$53,108	$49,551	$46,233	$20,159	($425,248 (0 71 %)
ADT -- Appointment Scheduling	$3,143	$21,576	$22,173	$20,688	$19,303	$18,010	$16,804	$15,679	$6,837	$144,215 (0 24 %)
YEARLY SUB-TOTALS	$132,096	$906,764	$931,842	$869,442	$811,221	$756,898	$706,213	$658,922	$287,316	$6,060,707 (10 14 %)
INCREASED AVAILABILITY of PROVIDER TIME										
Physician -- Administrating	$3,891	$33,373	$34,001	$31,724	$29,600	$27,618	$25,768	$24,043	$10,842	$220,859 (0 37 %)
Physician -- Productivity	$1,154,357	$7,923,993	$8,143,150	$7,597,850	$7,089,064	$6,614,350	$6,171,425	$5,758,159	$2,510,738	$52,963,080 (88 65 %)
YEARLY SUB-TOTALS	$1,158,248	$7,957,365	$8,177,151	$7,629,574	$7,118,664	$6,641,968	$6,197,193	$5,782,202	$2,521,580	$53,183,940 (89 01 %)
YEARLY BENEFITS	$1,301,009	$8,939,430	$9,186,285	$8,571,132	$7,997,171	$7,461,647	$6,961,982	$6,195,778	$2,832,834	$59,747,270

SOURCE Department of Defense data & Arthur D Little, Inc estimates

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PAS ECONOMIC ANALYSIS --ANALYSIS OF COSTS-- Page 1 of 2 TABLE D-13

ALL SITES Department of Defense inflation scenario @ 12 %

LAST INSTALLATION DATE October,1984

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
HARDWARE										
Non - Recurring										
Medical Treatment Recording Card	$125,000	$0	$0	$0	$0	$0	$0	$0	$0	$125,000 (2 18 %)
Hardware Installation	$144,000	$0	$0	$0	$0	$0	$0	$0	$0	$144,000 (2 52 %)
Recurring										
Equipment	$243,965	$425,106	$397,019	$370,433	$160,010	$0	$0	$0	$0	$1,596,553 (27 90 %)
PP Maintenance	$100,591	$164,253	$146,654	$130,941	$119,037	$106,283	$94,896	$86,241	$33,716	$982,614 (17 17 %)
Outside PPM	$6,634	$11,786	$10,523	$9,395	$8,541	$7,626	$6,809	$6,188	$2,670	$70,173 (1 23 %)
MIRC Maintenance	$7,750	$14,036	$13,108	$12,231	$11,412	$10,647	$9,934	$9,269	$4,180	$92,567 (1 62 %)
YEARLY SUB-TOTALS	$627,961	$615,180	$567,304	$523,000	$299,001	$124,557	$111,639	$101,699	$40,567	$3,010,908 (52 62 %)
SOFTWARE										
Non - Recurring										
Software Licence & Fee	$375,000	$0	$0	$0	$0	$0	$0	$0	$0	$375,000 (6 55 %)
Documentation	$10,000	$0	$0	$0	$0	$0	$0	$0	$0	$10,000 (0 17 %)
Recurring										
Software Maintenance	$77,500	$140,357	$131,084	$122,306	$114,116	$106,474	$99,344	$92,691	$41,801	$925,672 (16 18 %)
YEARLY SUB-TOTALS	$462,500	$140,357	$131,084	$122,306	$114,116	$106,474	$99,344	$92,691	$41,801	$1,310,672 (22 91 %)

PAS ECONOMIC ANALYSIS --ANALYSIS OF COSTS-- Page 2 of 2 TABLE D-13 Cont.

ALL SITES Department of Defense inflation scenario @ 12 %

LAST INSTALLATION DATE. October,1984

	1984	1985	1986	1987	1988	1989	1990	1991	1992	TOTALS
COMMUNICATION										
Non - Recurring										
Communication Equipment	$375,800	$0	$0	$0	$0	$0	$0	$0	$0	$375,800 (6 57 %)
Recurring										
Communication Equipment	$14,167	$25,732	$24,032	$22,423	$20,921	$19,520	$18,213	$16,993	$7,687	$169,689 (2 97 %)
YEARLY SUB-TOTALS	$389,967	$25,732	$24,032	$22,423	$20,921	$19,520	$18,213	$16,993	$7,687	$545,489 (9 53 %)
OTHER										
Non - Recurring										
Training	$71,143	$0	$0	$0	$0	$0	$0	$0	$0	$71,143 (1 24 %)
System Implementation	$12,500	$0	$0	$0	$0	$0	$0	$0	$0	$12,500 (0 22 %)
Site Preparation	$240,000	$0	$0	$0	$0	$0	$0	$0	$0	$240,000 (4 19 %)
Recurring										
Supplies	$29,105	$51,090	$47,714	$44,519	$41,538	$38,756	$36,161	$33,740	$14,700	$337,323 (5 90 %)
Overhead (space)	$1,211	$2,126	$1,985	$1,853	$1,728	$1,613	$1,505	$1,404	$612	$14,037 (0 25 %)
Support Personnel	$15,025	$27,211	$25,413	$23,711	$22,123	$20,642	$19,259	$17,970	$8,104	$179,457 (3 14 %)
YEARLY SUB-TOTALS	$368,983	$80,427	$75,113	$70,083	$65,390	$61,011	$56,925	$53,113	$23,415	$854,460 (14 93 %)
YEARLY COSTS	$1,849,411	$861,696	$797,532	$737,811	$499,427	$311,562	$286,122	$264,497	$113,470	$5,721,528

SOURCE Department of Defense data & Arthur D Little, Inc estimates

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